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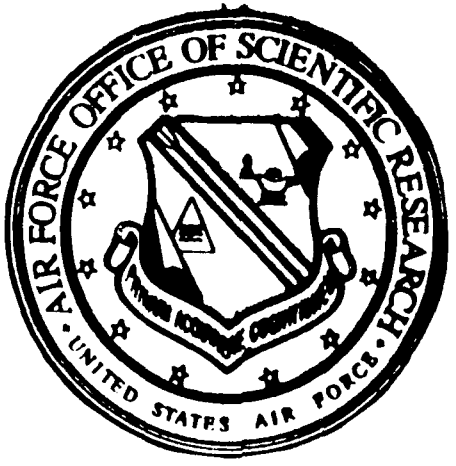

October - December 1990

AFOSR

TECHNICAL REPORT SUMMARIES

Forth Quarter 1990

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INTRODUCTION

The Air Force Office of Scientific Research Technical Report Summaries is published quarterly (March, June, September, and December). It contains a brief summary of each technical report received in the Technical Information Division and submitted to the Defense Technical Information Center (DTIC) for that quarter. Three indexes, subject, personal author and title are provided to help the user locate reports that may be of interest.

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PURPOSE

The purpose of this report is to inform Air Force Laboratories about the science that the Air Force Office of Scientific Research is supporting.

AFOSR MISSION

The Air Force Office of Scientific Research (AFOSR) is the Single Manager of the Air Force Defense Research Sciences Program (Program Element 61102F) and the primary Air Force agency for the extramural support of fundamental scientific research. The AFOSR is organized under the Air Force Systems Command, DCS/Technology.

AFOSR awards grants and contracts for research in areas of science relevant to the needs of the Air Force. Research is selected for support from proposals received in response to the Broad Agency Announcement originating from scientists investigating problems involving the search for new knowledge and the expansion of scientific principles. Selection is on the basis of scientific potential for improving Air Force operational capabilities, originality, significance to science, the qualification of the principal investigators, and the reasonableness of the proposed budget.

KEY TO READING THE DATA

The summaries consist of three indexes and the abstracts. From one of the indexes, locate the AD number of the report that is of interest to you. Use this number to locate the abstract of the report in the abstracts section. The first report submitted to DTIC during the quarter (the one with the lowest AD number) appears on the last page of the abstracts section. The last report submitted to DTIC during the quarter (the one with the highest DTIC number) appears on the first page of the abstracts section. The following terms will give you a brief description of the elements used in each summary of this report.

DTIC Report Bibliography - DTIC's brief description of a technical report.

Search Control Number - A number assigned by DTIC at the time a bibliography is printed.

AD Number - A number assigned to each technical report when received by the DTIC.

Field & Group Numbers - (appearing after the AD number) First number is the subject field, and the second number is the particular group under that subject field.

Corporate Author/Performing Organization - The organization; e.g., college/university, company, etc., at which the research is conducted.

Title - The title of the technical report.

Descriptive Note - Gives the type of report; e.g., final, interim, etc., and the period of the time of the research.

Date - Date of the technical report.

Pages - Total number of pages contained in the technical report.

Personal Author - Person or persons who wrote the report.

Contract/Grant Number - The instrument control number identifying the contracting activity and funding year under which the research is initiated.

Project Number - A number unique to a particular area of science; e.g., 2304 is the project number for mathematics.

Task Number - An alphanumeric number unique to a specific field of the main area of science; e.g., 2304 is the project number for mathematics and A3 is the task number for computational sciences.

Monitor Number - The number assigned to a particular report by the government agency monitoring the research. The number consists of the government monitor acronym, the present calendar year and the technical report assigned consecutively; e.g., AFOSR-TR-83-0001 is the first number used for the first technical report processed for Calendar Year 1983.

Supplementary Note - A variety of statements pertaining to a report. For example, if the report is a journal article, the supplementary note might give you the journal citation, which will include the name of the journal the article it appears in, and the volume number, date, and the page numbers of the journal.

Abstract - A brief summary describing the research of the report.

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Evidence for Anisotropic Vibration of Diatomic Adsorbates - NO and CO Chemisorbed on Stepped Pt(112),
AD-A229085 REPORT DATE: 15 FEB 90 ANNUAL REPORT

Excitation-Transfer Reactions from N2(A3 Sigma u+) and CO(a3II) to OH,
AD-A228939 REPORT DATE: 90 FINAL REPORT

Experimentation in Software Engineering.
AD-A226830 REPORT DATE: 20 NOV 85 FINAL REPORT

Extrathalamic Modulation of Cortical Function.
AD-A226786 REPORT DATE: 27 JUL 90 FINAL REPORT

Eye Movements and Visual Information Processing.
AD-A226782 REPORT DATE: 22 AUG 90 FINAL REPORT

Failure in Laminated Composite Plates Containing a Hole.
AD-A227307 REPORT DATE: 25 JUL 90 FINAL REPORT

Femtosecond Pump-Probe Spectroscopy of Polyatomic Molecules in Condensed Phases,
AD-A226863 REPORT DATE: 01 JUN 90 FINAL REPORT

Fluorescence Decay and Non-Radiative Relaxation Dynamics of the A 2 sigma(+) States of OH-Ar and OD-Ar,
AD-A226833 REPORT DATE: 13 APR 90 FINAL REPORT

Fundamental Penetration Mechanisms of a Flat-Plate in Saturated Clays.
AD-A227018 REPORT DATE: 28 AUG 90 FINAL REPORT

Fundamental Studies on High Temperature Deformation, Recrystallization, and Grain Growth of Two-Phase Materials.
AD-A229017 REPORT DATE: 26 SEP 90 FINAL REPORT

Group International Travel to World Round Table Conference on Sintering (7th).
AD-A229206 REPORT DATE: SEP 90 FINAL REPORT

Heating of Ion Conics in the Cusp/Cleft,
AD-A228767 REPORT DATE: 89 FINAL REPORT

Heterocycles Based on Group III, IV, and V Elements, Precursors for Novel Glasses and Ceramics.
AD-A226988 REPORT DATE: AUG 90 FINAL REPORT

Large Space Manipulators Study.
AD-A227276 REPORT DATE: JUN 90 FINAL REPORT

Laser-Induced Fluorescence Imaging of Laser-Ablated Barium,
AD-A226996 REPORT DATE: 30 APR 90 FINAL REPORT

Limits of Human Visual Discrimination: Toward a General Model of Visual Geometry.
AD-A226826 REPORT DATE: 01 MAR 90 FINAL REPORT

Liquid Crystalline Phosphazenes Bearing Biphenyl Mesogenic Groups,
AD-A227209 REPORT DATE: 90 FINAL REPORT

Macromolecular Association of ADP-Ribosyltransferase and Its Correlation with Enzymic Activity,
AD-A228922 REPORT DATE: 90 FINAL REPORT

Massively Parallel Network Architectures for Automatic Recognition of Visual Speech Signals.
AD-A226968 REPORT DATE: 90 FINAL REPORT

Mechanics of Concrete II.
AD-A229013 REPORT DATE: 18 OCT 90 FINAL REPORT

Merged Beam Studies of the Dissociative Recombination of H(+3) Ions with Low Internal Energy.
AD-A227036 REPORT DATE: 30 APR 86 FINAL REPORT

Mesomechanical Model for Fibre Composites.
AD-A226792 REPORT DATE: 30 JUL 90 ANNUAL REPORT

Modification of DEWAR-PI to Include Ring Strain,
AD-A226845 REPORT DATE: 90 FINAL REPORT

A Monte Carlo Method for Sensitivity Analysis and Parametric Optimization of Nonlinear Stochastic Systems: The Ergodic Case.
AD-A228946 REPORT DATE: AUG 90 ANNUAL REPORT

MPD Thrust Chamber Flow Dynamics.
AD-A227305 REPORT DATE: 23 AUG 90 FINAL REPORT

Multimodal Interactions in Sensory-Motor Processing.
AD-A229111 REPORT DATE: 15 SEP 90 ANNUAL REPORT

Multiple Optical Probing of High Frequency Semiconductor Devices.
AD-A228842 REPORT DATE: 14 NOV 89 FINAL REPORT

New Non-Linear Optical Polymers.
AD-A228746 REPORT DATE: AUG 90 FINAL REPORT

A New Procedure for 'Up-Grading' the Nicalon Polycarbosilane and Related Si-H Containing Organosilicon Polymers,
AD-A226839 REPORT DATE: 90 FINAL REPORT

A New Trifluorosilyl Exchange Reagent: Reactions of Cd(SiF3)2.glyme (glyme = dimethoxyethane) with Dibromo Metal Phosphine Complexes of Platinum, Palladium, and Nickel yield Trifluorosilyl Substituted Dialkyl Compounds,
AD-A228908 REPORT DATE: 90 FINAL REPORT

Nonlinear Finite Element Dynamics on Multiprocessor Computers.
AD-A227409 REPORT DATE: 31 JUL 90 FINAL REPORT

Non-Equilibrium Chemistry Effects on Hypersonic Separated Flows--Shock-Wave/Boundary-Layer Interaction.
AD-A229015 REPORT DATE: 27 SEP 90 FINAL REPORT

Novel Dynamics and Controls Analysis Methods for Nonlinear Structural Systems.
AD-A229164 REPORT DATE: 30 AUG 90 ANNUAL REPORT

Numerical Studies of the Structure of Turbulent Shear Flow.
AD-A228747 REPORT DATE: JUL 90 FINAL REPORT

Numerical Study of a Three-Dimensional Turbulent Boundary Layer.
AD-A227835 REPORT DATE: 31 AUG 90 FINAL REPORT

Numerical Study of a Three-Dimensional Vortex Method,
AD-A228763 REPORT DATE: JAN 90 FINAL REPORT

Observability of Systems with Complicated Dynamics.
AD-A229004 REPORT DATE: 23 OCT 90 FINAL REPORT

Opposed Jet Turbulent Diffusion Flames.
AD-A227048 REPORT DATE: 05 SEP 90 FINAL REPORT

Optical Symbolic Processor for Expert System Execution.
AD-A227045 REPORT DATE: 31 AUG 86 FINAL REPORT

Optimally Bounded Score Functions for Generalized Linear Models with Applications to Logistic Regression,
AD-A226860 REPORT DATE: 86 FINAL REPORT

Optimization Algorithms for New Computer Architectures with Application to Routing and Scheduling (Year 3).
AD-A228542 REPORT DATE: 01 OCT 90 FINAL REPORT

Optoelectronic Realizations of Neural Network Models.
AD-A228841 REPORT DATE: 12 OCT 90 FINAL REPORT

Oxygen Quenching of Positronium in Silica Gels,
AD-A226917 REPORT DATE: 02 APR 90 ANNUAL REPORT

Particle Acceleration by Electromagnetic Ion Cyclotron Turbulence,
AD-A228838 REPORT DATE: 89 ANNUAL REPORT

Particle Acceleration by Intense Auroral VLF Turbulence,
AD-A228764 REPORT DATE: 89 FINAL REPORT

Partitioning Reactions to Control and Develop Unique Microstructures.
AD-A229029 REPORT DATE: 15 SEP 90 FINAL REPORT

Perception and Temporal Properties of Speech.
AD-A226958 REPORT DATE: 26 JUL 90 ANNUAL REPORT

Phase Sensitive Amplification with SIS Mixers.
AD-A229031 REPORT DATE: 14 FEB 90 FINAL REPORT

Phosphoprotein Regulation of Behavioral Reactivity.
AD-A228751 REPORT DATE: 17 JUL 90 FINAL REPORT

Picosecond Laser System for High Speed Characterization of Monolithic Devices.
AD-A227372 REPORT DATE: 31 DEC 89 FINAL REPORT

Planar Laser-Fluorescence Imaging of Combustion Gases,
AD-A227213 REPORT DATE: 90 FINAL REPORT

Planar Laser-Induced Fluorescence Imaging of Shock-Heated Flows in Vibrational Nonequilibrium,
AD-A226997 REPORT DATE: 89 FINAL REPORT

Polarisation Radar Studies of Precipitation: Implementation of the Technique and Data Interpretation.
AD-A227073 REPORT DATE: 25 JUL 90 FINAL REPORT

Polymer Based Molecular Composites. Volume 171. Materials Research Society Symposium Proceedings Held in Boston, Massachusetts on 27-30 November 1989.
AD-A229199 REPORT DATE: SEP 90 FINAL REPORT

A Potential Surface for Ar-OH(2Sigma) and Ar-OD(2Sigma): Fitting and Assigning Experimental Data with Rigorous Theory.
AD-A226993 REPORT DATE: 90 FINAL REPORT

Preparation of a Polymeric Precursor to Silicon Carbide via Ring-Opening Polymerization: Synthesis of Poly(methylchorosilylene)methylene) and Poly(silapropylene),
AD-A226837 REPORT DATE: 89 FINAL REPORT

Preparation of Pb(x)Ba(1-x)TiO3 and the Effect of the Composition and the Size of the Crystallite on the Crystal Phase,
AD-A228761 REPORT DATE: 90 FINAL REPORT

Preparation of Silicon Carbide/Aluminum Nitride Ceramics Using Organometallic Precursors,
AD-A226865 REPORT DATE: FEB 90 FINAL REPORT

Presynaptic Modulation of the Hippocampal Mossy Fiber Synapse.
AD-A229105 REPORT DATE: 14 SEP 90 ANNUAL REPORT

Pre-Attentive and Attentive Visual Information Processing.
AD-A228541 REPORT DATE: 05 SEP 90 FINAL REPORT

Probabilistic Fracture Mechanics: A Validation of Predictive Capability.
AD-A228877 REPORT DATE: AUG 90 FINAL REPORT

Propulsion Research on the Hybrid Plume Rocket.
AD-A229163 REPORT DATE: 20 SEP 90 ANNUAL REPORT

Pseudomorphic InGaAs Materials.
AD-A226895 REPORT DATE: 31 JUL 90 FINAL REPORT

Pulse Propagation in Random Media.
AD-A229006 REPORT DATE: 11 JUN 90 FINAL REPORT

A Pyrolysis Mechanism for Ammonia.
AD-A226847 REPORT DATE: 90 FINAL REPORT

Quantum 1/f Noise in High Technology Applications Including Ultrasmall Structures and Devices.
AD-A226739 REPORT DATE: 15 JUL 90 ANNUAL REPORT

Reinforcement of Elastomers by the In-situ Generation of Filler Particles.
AD-A227208 REPORT DATE: 90 FINAL REPORT

Relationship of Selected Functions of Activated Macrophages.
AD-A226849 REPORT DATE: 10 AUG 90 FINAL REPORT

The Relevance of the Microphysical and Radiative Properties of Cirrus Clouds to Climate and Climatic Feedback.
AD-A228801 REPORT DATE: 15 JUL 90 ANNUAL REPORT

Reliability Modeling and Inference for Coherent Systems Subject to Aging, Shock or Repair.
AD-A229262 REPORT DATE: 31 AUG 90 FINAL REPORT

Research as part of the Air Force Research in Aero-Propulsion Technology (AFRAPT) Program.
AD-A226393 REPORT DATE: 01 AUG 90 FINAL REPORT

Research in Optical Symbolic Tasks.
AD-A228797 REPORT DATE: 29 NOV 89 FINAL REPORT

Research into the Design and Implementation of Knowledge Base Systems.
AD-A228373 REPORT DATE: 31 JUL 90 FINAL REPORT

Research on Certain Aspects of Laser Diffraction Particle Size Analysis Relevant to Autonomous Self-Diagnosing Instrumentation.
AD-A226322 REPORT DATE: 27 JUL 90 FINAL REPORT

Resonance Energies and Widths from the Poles of the Multichannel T Matrix.
AD-A229064 REPORT DATE: 02 NOV 90 FINAL REPORT

The Role of Ions in Soot Formation.
AD-A226862 REPORT DATE: 90 FINAL REPORT

The Role of Ledges in Phase Transformations.
AD-A228750 REPORT DATE: 17 SEP 90 FINAL REPORT

Rotational and Vibrational Relaxation of Small Molecules in Porous Silica Gels,
AD-A228925 REPORT DATE: 90 FINAL REPORT

Rotational Energy Transfer in Metastable States of Heteronuclear Molecules.
AD-A226768 REPORT DATE: JAN 89 FINAL REPORT

Sensor Based Control of Robotic Mechanisms.
AD-A226784 REPORT DATE: 15 AUG 90 FINAL REPORT

Short Wavelength Hydrogen Fluoride Chemical Lasers.
AD-B149450L REPORT DATE: 01 OCT 90 FINAL REPORT

Signal Processing and Recognition in Adaptive Neural Networks.
AD-A226828 REPORT DATE: 09 AUG 90 ANNUAL REPORT

Simulation Studies of Plasma Waves in the Electron Foreshock: The Generation of Downshifted Oscillations,
AD-A228766 REPORT DATE: 01 JUN 90 FINAL REPORT

Simulation Studies of Plasma Waves in the Electron Foreshock: The Generation of Langmuir Waves by a Gentle Bump-on-Tail Electron Distribution,
AD-A228765 REPORT DATE: 01 JUN 90 FINAL REPORT

Simulation Studies of Plasma Waves in the Electron Foreshock: The Transition from Reactive to Kinetic Instability,
AD-A228762 REPORT DATE: 01 JUN 90 FINAL REPORT

Simultaneous Measurements of Velocity, Temperature, and Pressure Using Rapid cw Wavelength-Modulation Laser-Induced Fluorescence of OH,
AD-A227135 REPORT DATE: 15 JUN 90 FINAL REPORT

A Single Server Queue with Mixed Types of Interruptions.
AD-A226919 REPORT DATE: 18 DEC 85 ANNUAL REPORT

Solid Fuel Combustion.
AD-A227170 REPORT DATE: AUG 90 FINAL REPORT

Some Applications of Probability and Statistics in Communication Theory and Signal Processing.
AD-A226869 REPORT DATE: 16 AUG 90 FINAL REPORT

Some New Estimation Methods for Weighted Regression When There are Possible Outliers,
AD-A226783 REPORT DATE: AUG 86 FINAL REPORT

Spectroscopy of the AlAr van der Waals Complex: Rotationally Resolved B 2 Sigma(+) yields X 2 Pi(1/2) Electronic Transitions,
AD-A226861 REPORT DATE: 01 MAR 90 FINAL REPORT

The Stability and Dynamics of Elastic Structures and Fluid Flows.
AD-A229047 REPORT DATE: SEP 90 FINAL REPORT

Stochastic Dynamics and Bifurcation Behavior of Nonlinear Nonconservative Systems in the Presence of Noise.
AD-A228923 REPORT DATE: 31 AUG 90 FINAL REPORT

Structural Properties of Randomized Times,
AD-A226951 REPORT DATE: 10 APR 85 ANNUAL REPORT

Studies in Statistical Signal Processing.
AD-A226825 REPORT DATE: 30 JUN 90 FINAL REPORT

Studying Quantum Phase-Based Electronic Devices.
AD-A226809 REPORT DATE: 15 AUG 90 FINAL REPORT

Summary of Recent Research Accomplishments on 'Stochastic Network Processes'
AD-A228952 REPORT DATE: 30 JUN 90 FINAL REPORT

A Synthesis for SF(5) Substituted Fluorocarbon Polymers,
AD-A228879 REPORT DATE: 90 FINAL REPORT

Synthesis of Tris(Trifluoromethyl)Gallium and Its Adducts.
AD-A229072 REPORT DATE: 90 ANNUAL REPORT

Tailored Interfaces for Metal-Matrix Composites-Fundamental Considerations.
AD-A229143 REPORT DATE: 31 OCT 90 ANNUAL REPORT

Technology Issues in Free-Space Optical Processing.
AD-A226831 REPORT DATE: 14 OCT 89 FINAL REPORT

Theory of Multicenter Partitioning of Molecular Energies,
AD-A226835 REPORT DATE: 01 JUN 90 FINAL REPORT

Towards an Integration of the Non-Invasive Methodologies of Cognitive Neuroscience: The Eleventh Carmel Workshop.
AD-A228945 REPORT DATE: 18 SEP 90 FINAL REPORT

Ultra High Speed Compound Semiconductors and Real Time Signal Processing.
AD-A226790 REPORT DATE: 30 JUN 90 FINAL REPORT

Unsteady Separation over Maneuvering Bodies.
AD-A226829 REPORT DATE: 15 AUG 90 FINAL REPORT

Use of D2 to Elucidate OMVPE Growth Mechanisms.
AD-A226966 REPORT DATE: 11 JUL 90 FINAL REPORT

Uses of Tyrosine in Foods to Amplify Catecholamine Release.
AD-A229126 REPORT DATE: 01 NOV 90 FINAL REPORT

Using Memory to Estimate Dates and Locations.
AD-A226848 REPORT DATE: 15 AUG 90 FINAL REPORT

Vortex Simulation of Turbulent Combustion.
AD-A229079 REPORT DATE: 01 OCT 90 ANNUAL REPORT

Workshop on Optical Neural Networks Held in Jackson, Wyoming on 7-10 February 1990.
AD-A229083 REPORT DATE: 28 SEP 90 FINAL REPORT

Xenobiotic Kinetics and Toxicity among Fish and Mammals.
AD-A229065 REPORT DATE: 19 SEP 90 FINAL REPORT

X-Ray Optics Research.
AD-A228940 REPORT DATE: 20 SEP 90 FINAL REPORT

2-D Velocity Measurements in Supersonic Flow Using Pulsed Planar Laser-Induced Fluorescence,
AD-A226994 REPORT DATE: 89 FINAL REPORT

ABSTRACTS

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-B149 450L 9/3

ANTROPIX CORP THE WOODLANDS TX

(U) Short Wavelength Hydrogen Fluoride Chemical Lasers.

DESCRIPTIVE NOTE: Final technical rept. 1 Sep 89-28 Feb 90.

OCT 90 61P

PERSONAL AUTHORS: Kunz, T. D.; Fredin, L. G.; Halligan, D. T.; Krenek, B. D.; Menefee, R. F.

REPORT NO. FTR90-1

CONTRACT NO. F49620-89-C-0118

MONITOR: AFOSR TR-90-1072

UNCLASSIFIED REPORT

Distribution: Further dissemination only as directed by Director, Dept. of Defense, Innovative Science and Technology, Strategic Defense Initiative Organization, Washington, DC 20301-7100; 19 Nov 90 or higher DoD authority.

SUPPLEMENTARY NOTE: Prepared in cooperation with Houston Advanced Research Center, The Woodlands, TX.

DESCRIPTORS: (U) *LASERS, ASTRONOMY, BLUE(COLOR), CHEMICAL LASERS, CHEMICAL REACTIONS, COEFFICIENTS, COMMERCE, COMPUTATIONS, DIAGNOSTIC EQUIPMENT, EXPERIMENTAL DATA, GAIN, HYDROGEN FLUORIDE, INSTRUMENTATION, MEASUREMENT, OPTICAL PROPERTIES, OPTICS, PARAMETERS, PERFORMANCE(ENGINEERING), PROBES, THEORY.

IDENTIFIERS: (U) PE63221C.

AD-A229 262 12/3

CALIFORNIA UNIV DAVIS

(U) Reliability Modeling and Inference for Coherent Systems Subject to Aging, Shock or Repair.

DESCRIPTIVE NOTE: Final rept. 1 Aug 88-31 Jul 90,

AUG 90 14P

PERSONAL AUTHORS: Samaniego, Francisco J.

CONTRACT NO. AFOSR-88-0308

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR, XF TR-90-1107, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This final report on grant AFOSR 88-0308 describes research accomplished during the period August 1, 1988-July, 1990 by Principal Investigator F.J. Samaniego and his collaborators under grant support. The results obtained in 8 completed manuscripts and two manuscripts in preparation are summarized. This research includes contributions to (i) product moment computation for multivariate survival functions (ii) parametric and nonparametric estimation in reliability (iii) the foundations of statistical estimation theory and (iv) nonstandard sampling techniques in life testing experiments. (kr)

DESCRIPTORS: (U) *STATISTICAL INFERENCE, *STATISTICAL TESTS, *MATHEMATICAL MODELS, COHERENCE, COMPUTATIONS, DOCUMENTS, ESTIMATES, LIFE TESTS, SHOCK, MOMENTS, MULTIVARIATE ANALYSIS, NONPARAMETRIC STATISTICS, PARAMETRIC ANALYSIS, RELIABILITY, REPAIR, STATISTICS, SURVIVAL(GENERAL), THEORY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A229 244 9/5

INTELLISYS CORP ALBUQUERQUE NM

(U) Development of a High-Imaging Speed SEM for Dynamically Loaded Materials.

DESCRIPTIVE NOTE: Final rept. Oct 88-Oct 90,

OCT 90 60P

PERSONAL AUTHORS: Fishbine, B. H.; Macy, R. J.; Ross, T. J.; Wang, M. L.

CONTRACT NO. F49620-89-C-0013

PROJECT NO. 3005

TASK NO. A1

MONITOR: AFOSR TR-90-1144

UNCLASSIFIED REPORT

ABSTRACT: (U) During this research effort, the concept of using a high-speed scanning electron microscope (SEM) observer real-time microstructural response of dynamically loaded structural materials was verified experimentally at a maximum framing rate of 381 Hz (256 horizontal pixels x 128 vertical pixels), about order of magnitude higher than previously possible with conventional SEM's. This experiment accomplishment proved the soundness of several key concepts: (1) That a tungsten hairpin cathode is bright enough to obtain useful digital images at the framing rate listed above; (2) that a secondary electronic detector can be built and operated at high enough count rates to obtain such images; (3) that the scan can assembly standard on an ISI SX-40A SEM can be replaced to allow imaging at such rates with spat resolution approaching 100nm; (4) that signal acquisition and scan generation can be synchronized obtain a succession of well-defined frames i n a 'movie' format at pixel rates far in excess of convention TV-rate SEM video bandwidths; and (5) that a magnetically-induced stress wave device can be used obtain dynamic fracture within the SEM chamber and field of view, with scanning timed to coincide with fracture. Also documented herein are unanticipated results which occurred during the research period. (ttl)

AD-A229 244

AD-A229 244 CONTINUED

DESCRIPTORS: (U) *ELECTRONIC SCANNERS, *IMAGES, *SCANNING, *VIDEO SIGNALS, ACQUISITION, ASSEMBLY, BANDWIDTH, CONSTRUCTION MATERIALS, COUNTING METHODS, DETECTORS, DIGITAL SYSTEMS, DYNAMICS, ELECTRONICS, FORMATS, FRACTURE(MECHANICS), FRAMES, HIGH RATE, MATERIALS, MICROSCOPES, MICROSTRUCTURE, MOTION PICTURES, OBSERVERS, RATES, REAL TIME, RESPONSE, SECONDARY, SIGNALS, TUNGSTEN.

IDENTIFIERS: (U) SEM(Scanning Electron Microscope).

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A229 206 11/8.2

NEW YORK STATE COLL OF CERAMICS ALFRED

(U) Group International Travel to World Round Table Conference on Sintering (7th).

DESCRIPTIVE NOTE: Final rept. Aug 89-Sep 90,

SEP 90 7P

PERSONAL AUTHORS: Spriggs, Richard N.

CONTRACT NO. AFOSR89-0428

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR, XF
TR-89-1126, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) An objective of the Conference and related Topical Symposia has been to bring together scientists, worldwide, who work in various fields of the science and technology of sintering and sintered materials. These conferences typically attract about 200 participants from 25 or more countries of the world. Such conferences represent the premier forum for discussions of all aspects of the science of sintering and have historically attracted most of the leading scientists and a significant number of younger sintering scientists. The International Program Committee for the VIIth Conference, for example, had leading sintering scientists from 23 countries, including six from the U.S. (R.L. Coble, R.M. German, D.L. Johnson, G.C. Kuczynski, H. Palmour III, and R.M. Spriggs as President of the Committee). Given its location in Yugoslavia, the Conference has also provided an unusual opportunity for international interactions. (ttl)

DESCRIPTORS: (U) *SYMPOSIA, .

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A2.

AD-A229 200 9/1

MATERIALS RESEARCH SOCIETY PITTSBURGH PA

(U) Interfaces in Composites. Volume 170. Materials Research Society Symposium Proceedings Held in Boston, Massachusetts on 27-29 November 1989.

DESCRIPTIVE NOTE: Final rept 22 Nov 89-21 Nov 90,

NOV 90 379P

PERSONAL AUTHORS: Ballance, John

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR
TR-90-1056

UNCLASSIFIED REPORT

ABSTRACT: (U) Conference Was Held On The Following Area. In Situ Patterning: Selective Area Deposition and Etching, Properties of II-VI Semiconductors: Bulk Crystals, Expitaxial Films, Quantum Well Structures, and Dilute Magnetic Systems; Impurities, Defects and Diffusion in Semiconductors: Bulk and Layered Structures, Chemical Vapor Deposition of Refractory Metals and Ceramics, and Tailored Interfaces in Composite Materials. (JS)

DESCRIPTORS: (U) , CERAMIC MATERIALS, CHEMICAL REACTIONS, COMPOSITE MATERIALS, CRYSTALS, DEPOSITION, DILUTION, ETCHING, GROUP II-VI COMPOUNDS, IMPURITIES, LAYERS, MAGNETIC DEVICES, QUANTUM ELECTRONICS, REFRACTORY METALS, SEMICONDUCTORS, STRUCTURES, VAPOR DEPOSITION.

IDENTIFIERS: (U) Pe61102F, WUAFOSR2306A2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A229 199 7/6

MATERIALS RESEARCH SOCIETY PITTSBURGH PA

(U) Polymer Based Molecular Composites. Volume 171. Materials Research Society Symposium Proceedings Held in Boston, Massachusetts on 27-30 November 1989.

DESCRIPTIVE NOTE: Final rept. 26 Nov 89-25 Nov 90,

SEP 90 463P

PERSONAL AUTHORS: Schaefer, Dale W.; Mark, James E.

CONTRACT NO. AFOSR-90-0089

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-90-1054

UNCLASSIFIED REPORT

ABSTRACT: (U) A symposium entitled 'Polymer Based Molecular Composites' was organized as part of the Materials Research Society Fall Meeting Held November 27-30, 1989 in Boston, Massachusetts. A total of 57 papers were presented during the symposium. The papers were arranged in the following eight categories: (1) Inorganics/Emulsions; (2) Emulsions/Blocks; (3) Rigid-Flexible Systems; (4) Blends/IPN's; (5) Ionomers/Structure; (6) Synthesis/Electrooptical Properties; (7) Interfaces/Mechanical Properties; (8) Miscellaneous/Conventional Composites. Two papers were recognized by the symposium organizers with awards as outstanding contributed papers. Two other papers in the symposium were recognized by the Materials Research Society with Graduate Student Awards to their presenters. (JS)

DESCRIPTORS: (U) *POLYMERS, AWARDS, COMPOSITE MATERIALS, ELECTROOPTICS, EMULSIONS, FLEXIBLE MATERIALS, INORGANIC MATERIALS, INTERFACES, IONOMERS, MASSACHUSETTS, MATERIALS, MECHANICAL PROPERTIES, MOLECULES, RIGIDITY, SOCIETIES, STUDENTS, SYMPOSIA, SYNTHESIS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

AD-A229 199

AD-A229 196 7/3

HAMPTON UNIV VA DEPT OF PHYSICS

(U) (DRUIP) Nozzle Beam Deposited Diamondlike Carbon Films.

DESCRIPTIVE NOTE: Final rept. 1 Dec 88-30 Nov 89,

NOV 89 23P

PERSONAL AUTHORS: Lowe, Calvin W.

CONTRACT NO. AFOSR-89-0196

PROJECT NO. 3842

TASK NO. A6

MONITOR: AFOSR, XF
TR-90-1135, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) It was attempted to deposit hard carbon films using the ionized cluster beam deposition method with organic materials. The principle idea was to have the organic molecules to decompose on impact with the substrate. A major problem involved the decomposition of organic starting material in the crucible. It was hoped to use lower crucible temperatures to reduce decomposition. Increased crucible temperatures were eventually used to increase the deposition rate. This resulted in more hydrogen in the chamber and the 50 I/s turbomolecular pump was unable to maintain a pressure below about 8 x 10-4 torr. Changes and experiments are being made, but to date the endeavor has been unsuccessful. Ion composition, Deposition beam, Organic chemistry. (JS)

DESCRIPTORS: (U) *ORGANIC MATERIALS, CARBON, CHEMICAL COMPOSITION, CRUCIBLES, DECOMPOSITION, DEPOSITION, DEPOSITS, FILMS, HYDROGEN, IONS, LOW TEMPERATURE, MOLECULES, NOZZLES, ORGANIC CHEMISTRY, ORGANIC COMPOUNDS, RATES, STARTING, SUBSTRATES, TEMPERATURE.

IDENTIFIERS: (U) PE61104D, WUAFOSR3842A6.

AD-A229 196

AD-A229 195 9/5

DUKE UNIV DURHAM NC DEPT OF COMPUTER SCIENCE

(U) Computational Complexity and Efficiency in Electro-Optical Computing Systems.

DESCRIPTIVE NOTE: Annual rept. 1 Apr 89-26 Jun 90,

JUN 90 38P

PERSONAL AUTHORS: Reif, John H.

CONTRACT NO. AFOSR-87-0386

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR, XF
TR-90-1080, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The Research Approach and Objectives were to: To develop robust theoretical model for a wide class of electro-optical systems; to extend the known capabilities, by design of new, more efficient algorithms for electro-optical computing using less time, volume, and energy. In particular, to develop efficient algorithms that use optimal combinations of time, volume, and energy on electro-optical computing systems; and to determine the fundamental theoretical limitations and capabilities of electro-optical computing systems. In particular, to determine lower bounds on tradeoffs between volume, time and other resources (such as energy) of any electro-optical computing systems to solve fundamental problems. (KR)

DESCRIPTORS: (U) *ELECTROOPTICS, *COMPUTERS, *OPTICAL PROCESSING, *TRADE OFF ANALYSIS, ALGORITHMS, COMPUTATIONS, EFFICIENCY, LIMITATIONS, MODELS, OPTIMIZATION, THEORY, TIME.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305B1.

AD-A229 164 12/4 13/13

TEXAS A AND M RESEARCH FOUNDATION COLLEGE STATION

(U) Novel Dynamics and Controls Analysis Methods for Nonlinear Structural Systems.

DESCRIPTIVE NOTE: Interim rept. 1 Jul 89-31 Jul 90,

AUG 90 120P

PERSONAL AUTHORS: Junkins, J. L.; Kurdila, A. J.; Rahman, Z. H.

CONTRACT NO. F49620-89-C-0084

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR, XF
TR-90-1077, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Significant progress is reported on analytical and computational methodology applicable to dynamics and control of flexible multibody structures. Especially significant are the following: (1) We have developed new analytical and numerical results pertaining to imposing constraints in multi-body dynamical modeling and numerical simulation. We have developed an extension of existing penalty methods for constrained multibody dynamics, including some significant convergence proofs. (2) We have developed a power principle which permits the efficient construction of stabilizing control laws for systems described by nonlinear systems of coupled ordinary and partial differential equations. (3) We have initiated a study of symbol manipulation methods to derive polynomial-type nonlinear feedback control laws for dynamical systems with polynomial nonlinearities. A general MACSYMA symbolic computer code has been developed and studies are under way on several test problems. Keywords: Maneuvers, Variation, Control. (kr)

DESCRIPTORS: (U) *FLEXIBLE STRUCTURES, *STRUCTURAL ANALYSIS, *NONLINEAR SYSTEMS, BODIES, COMPUTATIONS, COMPUTER PROGRAMS, CONSTRUCTION, CONTROL, CONTROL THEORY, CONVERGENCE, DYNAMICS, EFFICIENCY, MATHEMATICAL MODELS, METHODOLOGY, NUMERICAL ANALYSIS, PARTIAL DIFFERENTIAL

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A229 164 CONTINUED

EQUATIONS, PENALTIES, POLYNOMIALS, POWER, STABILIZATION, STRUCTURES, SYMBOLS, TEST AND EVALUATION.

IDENTIFIERS: (U) WUAFOSR2302B1, PE61102F.

AD-A229 163 22/2

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Propulsion Research on the Hybrid Plume Rocket.

DESCRIPTIVE NOTE: Annual rept. 1 Sep 89-31 Jan 90,

SEP 90 28P

PERSONAL AUTHORS: Chang-Diaz, F. R.; Yang, T. F.

CONTRACT NO. AFOSR-89-0345

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR, XF
TR-90-1137, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The propagation of rf waves launched in the end cell and central of the tandem mirror propulsion device has been investigated both theoretically and experimentally. Theoretically, a computer code has been developed to study the wave propagation in a nonhomogeneous magnetic field. It was found that the amplitude of the wave excited in the plasma peaked while approaching the resonance, but then damped out, indicating strong absorption of the wave by the plasma. The absorption took place near the axis and midplane of the device. The experimental results confirmed the theoretical prediction of the phenomena of the resonance effect. This means that the rf power is heating the plasma in center contrary to the earlier prediction that the heating was near the edge. Therefore higher efficiency can be possible. A very important discovery of this experiment was the broadening of the ICRF Fourier spectrum in the presence of the plasma. (kr)

DESCRIPTORS: (U) *HYBRID ROCKET ENGINES, *PLUMES, *ROCKET PROPULSION, ABSORPTION, AMPLITUDE, CELLS, COMPUTER PROGRAMS, EFFICIENCY, FOURIER ANALYSIS, LAUNCHING, MATHEMATICAL PREDICTION, MIRRORS, RADIOFREQUENCY, RADIOFREQUENCY POWER, RESONANCE, SPECTRA, THEORY, WAVE PROPAGATION, WAVES.

IDENTIFIERS: (U) WUAFOSR2308A1, PE61102F.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A229 143 11/4

NORTHWESTERN UNIV EVANSTON IL DEPT OF MATERIALS SCIENCE AND ENGINEERING

(U) Tailored Interfaces for Metal-Matrix Composites-Fundamental Considerations.

DESCRIPTIVE NOTE. Annual rept. 1 Oct 89-30 Sep 90,

OCT 90 61P

PERSONAL AUTHORS: Fine, Morris E.; Weertman, Julia R.

CONTRACT NO. AFOSR-89-0043

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR, XF
TR-90-1151, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of this research is to determine the interface properties needed for successful metal matrix composites and to learn how to achieve these properties. A number of factors have been selected for the study. These are thermodynamic stability of the interface, nature of the bonding across the interface, energy and structure of the interface, and role of adsorption at the interface. A number of systems have been chosen to probe these factors; namely, Al/TiC, Al/alpha-Al2O3, Al/MgAl2O4(spinel), Al/Al3(Tix, Zr1-x), Mg/SiC, Mg/MgO, and Mg/Al2O3. Techniques for preparing all of these composites have been worked out, including mechanical alloying followed by extrusion, arc melting, and liquid metal infiltration. MMCs also were obtained from Martin Marietta and Dow. Microstructures of the resulting MMCs are presented and discussed along with preliminary studies of some of the interfaces using transmission electron microscopy. In comparison to Al/SiC, Al/TiC and Mg/SiC show no evidence of chemical reaction at the interface during processing. Al/MgAl2O4(spinel) has superior mechanical properties to Al/alpha-Al2O3, both prepared identically. (Author) (tr)

DESCRIPTORS: (U) *INTERFACES, *METAL MATRIX COMPOSITES, *SURFACE PROPERTIES, ADSORPTION, ARC MELTING, CHEMICAL

AD-A229 143 CONTINUED

REACTIONS, ELECTRON MICROSCOPY, EXTRUSION, INFILTRATION(FLUIDS), LIQUID METALS, MECHANICAL PROPERTIES, MICROSTRUCTURE, STABILITY, THERMODYNAMICS, TRANSMITTANCE.

IDENTIFIERS: (U) WUAFOSR2306A1, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A229 126 5/8

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Uses of Tyrosine in Foods to Amplify Catecholamine Release.

DESCRIPTIVE NOTE: Final technical rept. 30 Mar 87-29 Mar 90,

NOV 90 6P

PERSONAL AUTHORS: Wurtman, Richard J.

CONTRACT NO. AFOSR-87-0229

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1148, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) These studies have been part of an ongoing research program on the ability to certain nutrients to affect the production of their neurotransmitter products, and thereby to affect behaviors and other brain functions (e.g., control of blood pressure). The studies have focused on the amino acid tyrosine - which is converted, in neurons or chromaffin cells, to dopamine, norepinephrine, and epinephrine. The effect of supplemental tyrosine on brian dopamine release has now been shown directly, using the new technique of in vivo microdialysis. Hemorhage, per se, has been shown to raise neuronal tyrosine levels, probably reflecting a protective mechanism to sustain blood pressure. Adenosine and the amino acid alanine have now also been shown to modulate blood pressure - and adenosine to mediate some of the fall in blood pressure caused by hemorrhage. Various dipeptides & diketopiperazines have been shown to enhance dopamine release, either by providing tyrosine or by direct actions. Keywords: Tyrosine; Nutrient; Catecholamine, Serotonin; Behavior. (js)

DESCRIPTORS: (U) *AMINO ACIDS, ADENOSINE, ALANINES, BLOOD PRESSURE, BRAIN, CATECHOLAMINES, CONTROL, DOPAMINE, EPINEPHRINE, FOOD, FUNCTIONS, HEMORRHAGE, NERVE CELLS, NEUROTRANSMITTERS, NOREPINEPHRINE, NUTRIENTS, PRODUCTION,

AD-A229 126

AD-A229 126 CONTINUED

RELEASE, SEROTONIN, TYROSINE.

IDENTIFIERS: (U) WUAFOSR2312A, PE61102F

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A229 125 5/8 22/5

EMORY UNIV ATLANTA GA

(U) Conference on Affect and Flashbulb Memories.

DESCRIPTIVE NOTE: Final technical rept. Sep 89-Aug 90,

OCT 90 7P

PERSONAL AUTHORS: Winograd, Eugene; Neisser, Ulric

CONTRACT NO. AFOSR-89-0431

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR, XF
TR-90-1082, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A conference was held on February 2-3, 1990, in Atlanta on the Emory campus on the topic of Affect and Flashbulb Memories. Fourteen speakers presented their research or discussed research presented by other conferees. The primary focus was on flashbulb memories of the Space Shuttle Challenger explosion of January 1986. Research was reported concerning peoples memories for information related to the disaster, including memory for their personal circumstances surrounding how they heard the news as well as their memory for the facts of the event. Primary attention was given to whether a special memory mechanism underlies vivid memories, whether these memories are established immediately at the time of the event rather than in subsequent recounting, whether these memories are as accurate as is presupposed by the flashbulb metaphor, and to the relationship between affect and memory. The results of the conference will be published as an edited volume in 1991 Cambridge University Press. Keywords: Emotions; Disasters; Memory (psychology). (Author) (emk)

DESCRIPTORS: (U) *MEMORY DEVICES, EMOTIONS, EXPLOSIONS, PSYCHOLOGY, SPACE SHUTTLES, SYMPOSIA.

IDENTIFIERS: (U) Affect/memory, Emotion/memory, WUAFOSR2313A4, PE61102F.

AD-A229 125

AD-A229 124 5/8 5/9 12/5

GEORGIA UNIV RESEARCH FOUNDATION INC ATHENS

(U) The Effect on Learning of Inferences in Instructional Text.

DESCRIPTIVE NOTE: Annual technical rept. 1 Sep 89-31 Aug 90,

SEP 90 14P

PERSONAL AUTHORS: Britton, Bruce K.

CONTRACT NO. AFOSR-89-0515

PROJECT NO. 2313

TASK NO. A7

MONITOR: AFOSR, XF
TR-90-1147, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A computational model was used to improve the learnability of an Air Force document, doubling recall and greatly improving recruits' mental representation of the content. Kintsch's computer model of reading was applied to a 1000 word Air Force text on the Air Force's role in Vietnam War. Principles of the model were used to identify 40 text locations where recruits would have to make inferences if they were to have a coherent mental representation of the text. Each location was then repaired, and the repaired text was then tested for learnability against the original text in two experiments. In experiment 1, free recall was doubled for the repaired text. In the second experiment, 120 recruits' 66-part mental representations for 12 important text concepts were measured, and compared with the mental representations of the text's author, and of 7 independent subject matter experts. The author and the experts' mental representations correlated about .80. For recruits who read the repaired text, their mental representations correlated with the author and experts about .55 = N < 0.05. But recruits who read the original text correlated with the author and experts only about . 10. These results suggest that the computational model can be used to improve the learnability of Air Force tests. Individual differences tests of inferencing

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A229 124 CONTINUED

ability were developed.

DESCRIPTORS: (U) *LEARNING, *READING, *MEMORY(PSYCHOLOGY), AIR FORCE, COHERENCE, COMPUTATIONS, COMPUTERIZED SIMULATION, DOCUMENTS, MATHEMATICAL MODELS, MENTAL ABILITY, MODELS, RECALL, RECRUITS, ROLES(BEHAVIOR), TEST AND EVALUATION, TEXTBOOKS, VIETNAM, WARFARE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A7, KINTSCH Computer Model, Inference making Ability.

AD-A229 114 12/9

IONA COLL NEW ROCHELLE NY MACHINE INTELLIGENCE INST

(U) The Development of Structure for the Representation and Manipulation of Sophisticated Knowledge in Intelligent Systems.

DESCRIPTIVE NOTE: Final rept. 1 Feb 87-31 Mar 90,

MAR 90 9P

PERSONAL AUTHORS: Yager, Ronald R.

CONTRACT NO. AFOSR-87-0126

PROJECT NO. 2304

TASK NO. A7

MONITOR: AFOSR, XF
TR-90-1112, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The central focus of the research was the development of a unified theory for reasoning under uncertainty in knowledge base systems. In particular an effort was made to bring together the concepts of fuzziness, lack of specificity, randomness, and monotonicity, under one framework. A number of issues relating to this goal were investigated. This effort resulted in 56 submitted papers of which 49 have been published and 7 are to appear in the near future. Keywords: Aggregation operators, Multivalued variables, Integer programming, Neural nets, Fuzzy sets. (kr)

DESCRIPTORS: (U) *KNOWLEDGE BASED SYSTEMS, FUZZY SETS, INTEGER PROGRAMMING, NEURAL NETS, REASONING, UNCERTAINTY, VARIABLES.

IDENTIFIERS: (U) 34A7, PE61102F, *Knowledge representation.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A229 111 6/5

DARTMOUTH MEDICAL SCHOOL HANOVER NH

(U) Multimodal Interactions in Sensory-Motor Processing.

DESCRIPTIVE NOTE: Annual technical rept. Jul 89-Jul 90,

SEP 90 91P

PERSONAL AUTHORS: Hughes, H. C.; Reuter-Lorenz, P. A.; Fendrich, R.; Nozawa, G.; Gazzaniga, M. S.

CONTRACT NO. AFOSR-89-0437

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR, XF
TR-90-1132, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The saccadic control system to study the selection of stimulus events according to their spatial location. The present work focuses on two factors known to influence saccade latency: the presence of a fixation stimulus and the nature of the saccade target. We report evidence which suggests that fixation point offsets facilitate pre-motor stages of saccade generation (Reuter-Lorenz) et al., in press; Appendix I). This idea, in conjunction with electrophysiological data, suggested that fixation offset might also facilitate saccades to acoustic targets. Experiment 1 confirmed this suggestion (Fendrich, et al. (in preparation)). The facilitatory effects of redundant stimulation via the visual and auditory modalities is examined in Experiment 2 (Nozawa et al., 1990). The data suggest significant neural summation, which we attribute to bimodal convergence onto individual cells though to mediate saccadic command functions. (js)

DESCRIPTORS: (U) *MULTIMODE, *STIMULI, *VISION, *PERCEPTION, CONVERGENCE, DUAL MODE, ELECTROPHYSIOLOGY, INTERACTIONS, POSITION(LOCATION), REDUNDANCY, REPORTS, SELECTION, SPATIAL DISTRIBUTION, STIMULATION(GENERAL).

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A4, Visual Modalities, Auditory Modalities.

AD-A229 111

AD-A229 110 6/1

TEXAS UNIV AT EL PASO

(U) Equipment Support Grant for Air Force Task 'Chemical Defense Drugs Effects with Exercise and Thermal Stress'.

DESCRIPTIVE NOTE: Final rept. 1 May 89-30 Apr 90,

OCT 90 17P

PERSONAL AUTHORS: Elizondo, Reynaldo S.

MONITOR: AFOSR, XF
TR-90-1086, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The effects of a single intramuscular atropine injection (0.03 mg/kg) at ambient temperatures (Ta) of 25 C and 35 C and pyridostigmine treatment (5 doses (0.4 mg/kg)) at Ta of 35 C on the thermoregulatory capacity and exercise tolerance time of patas monkeys were investigated. A primate treadmill device was developed and used to evaluate the effects of the drugs on the exercise tolerance time. Rectal temperature (Tre) and heart rate (HR) were continuously monitored by a telemetry system while water loss was estimated from weight differences before and after exercise. Atropine effects were more pronounced at Ta of 35 C as indicated by a signif cant reduction in water loss (43%) which was associated with an average exercise time of 65 min less than the control value. The final HR and Tre responses in these atropine experiments were significantly elevated above the control values. Pyridostigmine significantly increased water loss (61%) which was associated with an average exercise time of 60 min longer than the control value. (js)

DESCRIPTORS: (U) *DRUGS, *INTRAMUSCULAR INJECTIONS, ATROPINE, BODY TEMPERATURE, CONTROL, EXERCISE(PHYSIOLOGY), HEART RATE, LOSSES, MONKEYS, PRIMATES, RECTUM, TELEMETER SYSTEMS, TEMPERATURE, THERMAL STRESSES, TIME, TOLERANCES(PHYSIOLOGY), TREADMILLS, VALUE, WATER.

AD-A229 110

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A229 105 6/5

EAST CAROLINA UNIV SCHOOL OF MEDICINE GREENVILLE NC

(U) Presynaptic Modulation of the Hippocampal Mossy Fiber Synapse.

DESCRIPTIVE NOTE: Annual rept. 15 Sep 89-14 Sep 90,

SEP 90 11P

PERSONAL AUTHORS: Terrian, David M.

CONTRACT NO. AFOSR-89-0531

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1098, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The overall goal of this research project is to systematically investigate a number of the possible through which presynaptic modulation might influence the effectiveness of local synaptic interactions at the mammalian hippocampal mossy fiber synapse. The potential significance of this research has been dramatically highlighted by the events of this past year, in which several different laboratories conclusively demonstrated that long-term potentiation (LTP) in the mossy fiber-CA3 synapse involves an enhancement of neurotransmitter release (Bekkers et al., 1990; Malinow and Tsien, 1990; Staubli et al., 1990; Zalutsky and Nicoll, 1990). The LTP of synaptic transmission in the hippocampus is a widely studied model system for understanding the cellular mechanisms of memory and synaptic plasticity. Thus, a definitive link has now been established between mossy fiber synaptic plasticity and the presynaptic modulation of this synaptic input. Specifically, any factor that is capable of enhancing or suppressing the release of mossy fiber transmitters will have a predictable effect on the probability that LTP is maintained in the mossy fiber-CA3 synapse. Keywords: Presynaptic, Hippocampus, Mossy fiber, Long-term potentiation, Glutamate, Dynorphin. (js)

DESCRIPTORS: (U) *HIPPOCAMPUS, *FIBERS, *SYNAPSE, CYTOLOGY, GLUTAMIC ACID, INPUT, INTERACTIONS, MEMORY

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AD-A229 105 CONTINUED

DEVICES, MODELS, NEUROTRANSMITTERS, OPTIMIZATION, PLASTIC PROPERTIES, PREDICTIONS, RELEASE, SALTS, TRANSMITTANCE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A2

AD-A229 105

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A229 085 7/2

PITTSBURGH UNIV PA

(U) Evidence for Anisotropic Vibration of Diatomic Adsorbates - NO and CO Chemisorbed on Stepped Pt(112).

FEB 90 7P

PERSONAL AUTHORS: Szabo, A.; Henderson, M. A.; Yates, J. T., Jr

CONTRACT NO. AFOSR-82-0133

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1123, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Both NO and CO preferentially chemisorb on step sites of the Pt(112) crystal orienting the intermolecular bond in the downstairs direction. Using the digital electron stimulated desorption-ion angular distribution method (ESDIAD), an elliptical angular distribution of the desorbing) + ions was detected from the MO/Pt(112) system with the longer axis of the ellipse normal to the step-edge direction. On the other hand, the)+ ESDIAD pattern from the CO/Pt(112) system shows an approximately cylindrical symmetric shape. Heating of the crystal leads to broadening of the ion desorption patterns in both cases without change in the patterns' elliptical or circular cross-sectional geometry. These results are interpreted as being due to ion desorption from NO molecules bonded to two Pt atoms on the step edge and vibrating with a longer amplitude in the vibration is approximately the same in directions parallel and perpendicular to the step edge. Thus, in certain cases ESDIAD patterns may be used to determine the hybridization state of adsorbates. (ttl)

DESCRIPTORS: (U) , REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A2, ESDIAD(Electron Stimulated Desorption-Ion Angular Distribution).

AD-A229 083 12/6 23/2 12/9

COLORADO UNIV AT BOULDER DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Workshop on Optical Neural Networks Held in Jackson, Wyoming on 7-10 February 1990.

DESCRIPTIVE NOTE: Final rept. 1 Mar-30 Sep 90,

SEP 90 30P

PERSONAL AUTHORS: Wagner, Kelvin

CONTRACT NO. AFOSR-90-0176

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR, XF
TR-90-1150, AFOSR

UNCLASSIFIED REPORT

DESCRIPTORS: (U) *FIBER OPTICS, *NETWORKS, *NEURAL NETS, ALGORITHMS, COMPUTER ARCHITECTURE, BIONICS.

IDENTIFIERS: (U) Optical neural networks, WUAFOSR2305B1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A229 082 9/1

MINNESOTA UNIV ST PAUL

(U) High Temperature Superconducting Compounds.

DESCRIPTIVE NOTE: Final technical rept. 1 Sep 87-30 Sep 90.

OCT 90 12P

PERSONAL AUTHORS: Goldman, Allen M.; Mecartney, Martha L.

CONTRACT NO. AFOSR-87-0372

PROJECT NO. 2306

TASK NO. C1

MONITOR: AFOSR TR-90-1149

UNCLASSIFIED REPORT

ABSTRACT: (U) High-Tc superconductors have been investigated in both bulk and thin film form. A technique for the in-situ preparation of high-Tc superconducting films involving the use of ozone-assisted Molecular Beam Epitaxy has been developed. The procedures seem be to generalized to the extent that high quality trilayer and multilayer structures which would be useful scientifically and technologically are possible. In addition to the process working with the usual substrates, it has been possible to deposit films on Si substrates without any buffer layer. A bolometer has been sucessfully fabricated on a thermally isolated SiN substrate coated with YSZ. Very thin and transparent films with relatively high transition temperatures have been prepared. The magnetic properties of bulk polycrystalline and single crystal high temperature superconductors have been measured and reveal important features of flux pinning and anistropy in these materials. A low temperature scanning tunneling microscope for the investigation of the surfaces of high-Tc superconductors has been developed. Keywords: Superconductivity, Materials, Thin films. (js)

DESCRIPTORS: (U) *SUPERCONDUCTORS, BOLOMETERS, BUFFERS, DEPOSITS, FILMS, FLUX(RATE), HIGH TEMPERATURE, LAYERS, MAGNETIC PROPERTIES, PREPARATION, STRUCTURES, SUBSTRATES,

AD-A229 082 CONTINUED

SUPERCONDUCTIVITY, THIN FILMS, TRANSITION TEMPERATURE, TRANSPARENCE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306C1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A229 080 20/9

MISSION RESEARCH CORP NEWINGTON VA

(U) The DIMEX Experiment.

DESCRIPTIVE NOTE: Final rept.,

SEP 90 68P

PERSONAL AUTHORS: Brandenburg, John; Bollen, W. M.; Seeley, Robert; Nguyen, Khanh

REPORT NO MRC/WDC-R-230

CONTRACT NO F49620-89-C-0106

PROJECT NO. 2301

TASK NO A8

MONITOR: AFOSR, XF
TR-90-1075, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) DIMEX (DIpole plasma Microwave EXposure) experiment has demonstrated both stable confinement of plasma at electron densities of the order of 10 to the 11th power and electron temperatures of 1 eV and also has demonstrated strong absorption of 1 GHz microwaves with much reduced reflection (-10dB). In addition, high-intensity microwaves (greater than 0.1 W/sq cm) were strongly reflected, indicating that the plasma shell can function as a cloak to radar and a shield to HPM. It is believed that the successful demonstration of plasma confinement, cloaking to low-intensity microwaves, and even shielding to high-intensity microwaves can be explained in terms of exiting theory, drawn from the magnetic and laser fusion communities. (JHD)

DESCRIPTORS: (U) *CONFINEMENT(GENERAL), *PLASMAS(PHYSICS), RADIATION ABSORPTION, DEMONSTRATIONS, DIPOLES, ELECTRON DENSITY, EXPOSURE(GENERAL), INTENSITY, LASER INDUCED FUSION, MICROWAVES, RADAR, REDUCTION, REFLECTION, SHELLS(STRUCTURAL FORMS), SHIELDING, STABILITY, ELECTROMAGNETIC SHIELDING.

IDENTIFIERS: (U) WUAFOSR2301A8, PE61102F, DIMEX Experiment, DIMEX(Dipole Plasma Microwave Excposure).

AD-A229 080

AD-A229 079 20/4

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Vortex Simulation of Turbulent Combustion.

DESCRIPTIVE NOTE: Annual rept. Aug 89-Sep 90,

OCT 90 10P

PERSONAL AUTHORS: Ghoniem, Ahmed F.

CONTRACT NO. AFOSR-89-0491

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1115, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This activity focused on the effect of density variation due to temperature/molecular weight difference and/or heat release in a reacting shear layer in two and three dimensional configurations. In the spatially growing 2D layer, results confirm mixing asymmetry due to density difference between the two streams. A light fast stream has a destabilization effect on the early stages of development; it promotes early roll-up; induces stronger winding inside the eddies, and initiates the pairing at earlier stages. However, the overall spatial growth rate of the layer increases as the density ratio becomes higher; bigger eddies are formed and pairing is completed faster. In 3D simulations, density difference continues to impart a convection velocity on the structures in the direction of heavy stream. That influences the evolution of the streamwise mixing modes and spanwise preferential entrainment is observed. 3D reacting shear layer simulations confirmed earlier 2D observations that although the react on zone structure depends on the Damkohler number, product distribution is independent of the kinetic parameters and exhibit strong resemblance to the vorticity field. (JHD)

DESCRIPTORS: (U) *COMBUSTION, *TURBULENCE, *VORTICES, ASYMMETRY, CONFIGURATIONS, CONVECTION, DENSITY, GROWTH(GENERAL), HEAT, KINETICS, LAYERS, MIXING, MOLECULAR WEIGHT, PARAMETERS, RATES, RATIOS, RELEASE.

AD-A229 079

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A229 079 CONTINUED

SHEAR PROPERTIES, SIMULATION, SPATIAL DISTRIBUTION, TEMPERATURE, THREE DIMENSIONAL, TWO DIMENSIONAL, VARIATIONS, VELOCITY.

IDENTIFIERS: (U) WUAFOSR2308A2, PE61102F, Damkohler Number, *Turbulent Combustion.

AD-A229 072 7/3

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) Synthesis of Tris(Trifluoromethyl)Gallium and Its Adducts.

DESCRIPTIVE NOTE: Journal article,

90 5P

PERSONAL AUTHORS: Guerra, M. A.; Mehritra, S. K.; Dyer, D. W.; Lagow, R. J.

CONTRACT NO. AFOSR-88-0084

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-90-1094, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Organometallic Chemistry, v390 pc73-c76 1990.

ABSTRACT: (U) Tris(trifluoromethyl)gallium and its trimethylphosphine and trimethylarsine complexes have been synthesized using the Morrison reagent. Several new materials of potential importance to the microelectronic industry have been produced.

DESCRIPTORS: (U) , REPRINTS.

IDENTIFIERS: (U) WUAFOSR2303B2, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A229 065 6/5

WASHINGTON STATE UNIV PULLMAN COLL OF PHARMACY

(U) Xenobiotic Kinetics and Toxicity among Fish and Mammals.

DESCRIPTIVE NOTE: Final rept. 15 Sep 88-30 Jun 90,

SEP 90 10P

PERSONAL AUTHORS: Hayton, William L.

CONTRACT NO. AFOSR-88-0345

PROJECT NO. 2312

TASK NO. A4

MONITOR: AFOSR, XF
TR-90-1146, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Work was focused on paraoxon, a direct inhibitor of acetylcholisterase (AChE) and a potent toxicant on the cholinergic nervous system. While paraoxon inhibits AChE in all tissues, the tissue in which inhibition results in death is not known for certain. It is clear that death after acute paraoxon poisoning results from asphyxiation. The dose of paraoxon at cessation of breath (CoB1) average 5.7 mg/kg at all infusion rates, which suggests that the same site of action and mechanism for paraoxon-induced CoB was in effect at all infusion rates. While heart AChE activity at CoB was independent of the infusion rate, heart appeared not to be the sensitive site since it was pumping blood at CoB. A site of action consistent with the data was CNS outside the blood-brain barrier. With low infusion rate most of the total brain AChE was inhibited. With increasing infusion rate, inhibition of total brain AChE activity would decrease, due to less time for paraoxon to penetrate the BBB; the extra-BBB site would always be rapidly inhibited. Heart and diaphragm AChE was at the level observed at CoB while inhibition of brain AChE increased with increasing dose, again indicating brain as the sensitive site. (JS)

DESCRIPTORS: (U) *ACETYLCHOLINESTERASE, *INHIBITORS, *NITROPHENOLS, *PHOSPHATES, ASPHYXIATION, BARRIERS, BLOOD,

AD-A229 065

AD-A229 065 CONTINUED

BRAIN, CHOLINERGIC NERVES, DEATH, DIAPHRAGMS(MECHANICS), DOSAGE, HEART, INDICATORS, INFUSIONS, INHIBITION, INSECTICIDES, LOW RATE, MAMMALS, NERVOUS SYSTEM, POISONING, POTENCY, PUMPING, RATES, SENSITIVITY, SITES, TISSUES(BIOLOGY), TOXIC AGENTS, TOXICITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A4, Paraoxon.

AD-A229 065

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A229 064 20/8

OKLAHOMA UNIV NORMAN DEPT OF PHYSICS AND ASTRONOMY

(U) Resonance Energies and Widths from the Poles of the Multichannel T Matrix.

DESCRIPTIVE NOTE: Final rept. 1 Sep 84-31 Jul 90,

NOV 90 6P

PERSONAL AUTHORS: Watson, Deborah K.

CONTRACT NO. AFOSR-84-0379

PROJECT NO. 2301

TASK NO. A4

MONITOR: AFOSR, XF
TR-90-1145, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A multichannel iteration technique was developed to obtain accurate results for phase shifts from a 'smooth' Schwinger K matrix. Applications were made to e + He+ phase shifts in one, two, and three channel approximations. A second project was started to study excited states of helium using dimensional analysis. A moment method is being used to solve the two-electron Schrodinger equation generalized to an arbitrary number of dimensions. Keywords: Helium. (kr)

DESCRIPTORS: (U) *ITERATIONS, *MULTICHANNEL, *PHASE SHIFT, ACCURACY, APPROXIMATION(MATHEMATICS), CHANNELS, ELECTRON TRANSITIONS, ENERGY, HELIUM, METHOD OF MOMENTS, RESONANCE, SCHRODINGER EQUATION, SIZES(DIMENSIONS).

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A4.

AD-A229 064

AD-A229 051 5/8 5/6

WISCONSIN UNIV-MADISON DEPT OF PSYCHOLOGY

(U) Comprehension of Illustrated Text: Pictures Help to Build Mental Models.

DESCRIPTIVE NOTE: Annual technical rept. 1 Jul 89-30 Jun 90,

SEP 90 41P

PERSONAL AUTHORS: Glenberg, Arthur M.; Langston, William E.

CONTRACT NO. AFOSR-89-0367

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR, XF
TR-90-1083, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Pictures help people to comprehend and remember texts. We report two experiments designed to test among several accounts of this facilitation. Students read texts describing four-step procedures in which the middle steps were described as occurring at the same time, although the verbal description of the steps was sequential. A mental representation of the procedure would have the middle steps equally strongly related to the preceding and succeeding steps (because the steps are performed simultaneously), whereas a mental representation of the text would have the middle step that was described first more closely related to the preceding step than the middle step described. After reading, strengths of the represented relationships between the steps were assessed. When the texts were accompanied by appropriate pictures, subjects tended to mentally represent the procedure. When the texts were presented alone or with pictures illustrating the order in which the steps were described in the text, subjects tended to mentally represent the text. We argue that these results disconfirm motivational, repitition, and dual code explanations of the facilitative effects of pictures. The results are consistent with a version of mental model theory that proposes that pictures help to

AD-A229 051

AD-A229 051 CONTINUED

build mental models of what the text is about. Keywords: Memory psychology; Reading comprehension; Teaching methods/pictures. (Author) (emk)

DESCRIPTORS: (U) *COMPREHENSION, *MENTAL ABILITY, CODING, MEMORY(PSYCHOLOGY), MODEL THEORY, MODELS, PICTURES, READING, REPORTS, STUDENTS, TEACHING METHODS, TEXTBOOKS.

IDENTIFIERS: (U) Mental models, PE61102F, WUAFOSR2313A4.

AD-A229 047 20/4

NORTHWESTERN UNIV EVANSTON IL DEPT OF ENGINEERING SCIENCE AND APPLIED MATHEMA TICS

(U) The Stability and Dynamics of Elastic Structures and Fluid Flows.

DESCRIPTIVE NOTE: Final rept. 1 Feb 85-28 Feb 90,

SEP 90 24P

PERSONAL AUTHORS: Reiss, Edward L.

CONTRACT NO. AFOSR-85-0150

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR, XF
TR-90-1133, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The main thrust of our research program has been the development and applications of asymptotic and perturbation methods for analyzing: the stability and dynamics of elastic structures, fluid flow, and other nonlinear problems; and for problems of scattering of acoustic, electromagnetic and other waves. Keywords: Poiseuille flow, Channel flow, Convection (Heat transfer), Bipolar Transistors, Bipolar oscillators, Flutter, Q switching, Ring lasers, Pharmakokinetics, Control theory, Acoustic scattering, Phase transformations, Caustics, Fluid mechanics. (jhd)

DESCRIPTORS: (U) *ELASTIC PROPERTIES, *FLUID MECHANICS, *PERTURBATION THEORY, ACOUSTIC SCATTERING, BIPOLAR SYSTEMS, BIPOLAR TRANSISTORS, CAUSTICS, CHANNEL FLOW, CONTROL THEORY, CONVECTION, DYNAMICS, FLUID FLOW, FLUTTER, HEAT TRANSFER, NONLINEAR SYSTEMS, OSCILLATORS, PHASE TRANSFORMATIONS, POISEUILLE FLOW, Q SWITCHING, RING LASERS, SCATTERING.

IDENTIFIERS: (U) Hopf Bifurcation, WUAFOSR2304A4, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A229 045 21/2 20/5

PURDUE UNIV LAFAYETTE IN

(U) Asynchronous Optical Sampling for Laser-Based Combustion Diagnostics in High-Pressure Flames.

DESCRIPTIVE NOTE: Annual technical rept. 15 Dec 88-14 Dec 89,

JAN 90 16P

PERSONAL AUTHORS: King, G. B.; Laurendeau, N. M.; Lytle, F. E.

CONTRACT NO. AFOSR-89-0051

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1141, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describe the progress on the development of a new laser based combustion diagnostic for the quantitative measurement of both major and minor species in high pressure flames. The technique, Asynchronous Optical Sampling (ASOPS), is a state of the art improvement in picosecond pump/probe spectroscopy. Final results from the study of atomic sodium in an atmospheric flame are presented. The first ever UV pump/UV probe ASOPS signal for atomic indium is shown. Techniques for noise reduction are discussed along with initial results. Keywords: Probe spectroscopy; Combustion; Laser diagnostics; Stimulated emission. (jhd)

DESCRIPTORS: (U) *COMBUSTION, *DIAGNOSTIC EQUIPMENT, ASYNCHRONOUS SYSTEMS, EMISSION, FLAMES, HIGH PRESSURE, LASER APPLICATIONS, LASERS, MEASUREMENT, NOISE REDUCTION, OPTICAL PROPERTIES, PROBES, OPTICAL PUMPING, SAMPLING, SPECTROSCOPY, STATE OF THE ART, ULTRAVIOLET RADIATION.

IDENTIFIERS: (U) WUAFOSR2308A2, PE61102F.

AD-A229 045

AD-A229 032 12/5

UTAH STATE UNIV LOGAN

(U) Environmental Containment Property Estimation Using QSARs in an Expert System.

DESCRIPTIVE NOTE: Annual rept. 15 Aug 89-15,

SEP 90 72P

PERSONAL AUTHORS: Doucette, William J.; Stevens, David K.; Dupont, R. R.; McLean, Joan E.; Denne, Doug

CONTRACT NO. AFOSR-89-0509

PROJECT NO. 2312

TASK NO. A4

MONITOR: AFOSR, XF
TR-90-1100, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A microcomputer based Property Estimation Program (PEP) and Database (DB), utilizing molecular connectivity indices (MCI)-property and property-property correlations, as well as UNIFAC derived activity coefficients, has been designed to provide both experts and non-experts with a fast, economical method to estimate compound aqueous solubility, octanol/water partition coefficient, vapor pressure, organic carbon normalized soil sorption coefficient, BCF, and Henry's Law constant for use in environmental fate modeling. The user can input the required structural information using either Simplified Molecular Input Line Entry System (SMILES) notation or connection tables generated from two commercially available two-dimensional drawing programs, ChemDraw or ChemIntosh. Estimates of predictor accuracy are provided along with the estimated property values. The development and current status of the PEP-DB program is described. (JS)

DESCRIPTORS: (U) *DATA BASES, *ENVIRONMENTS, ACCURACY, ACTIVATION, CARBON, COEFFICIENTS, CONTAINMENT(GENERAL), ENGINEERING DRAWINGS, ESTIMATES, EXPERT SYSTEMS, LOW COSTS, ORGANIC MATERIALS, PREDICTIONS, SOILS, SOLUBILITY, SORPTION, STRUCTURAL PROPERTIES, TWO DIMENSIONAL, VALUE, VAPOR PRESSURE, WATER.

AD-A229 032

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A229 032 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A4.

AD-A229 031 20/3

ROCHESTER UNIV NY DEPT OF ELECTRICAL ENGINEERING

(U) Phase Sensitive Amplification with SIS Mixers.

DESCRIPTIVE NOTE: Final rept. 15 Jan 87-14 Feb 90,

FEB 90 6P

PERSONAL AUTHORS: Bocko, Mark F.

CONTRACT NO. AFOSR-87-0131

PROJECT NO. 2305

TASK NO. C3

MONITOR: AFOSR, XF
TR-90-1096, AFOSR

UNCLASSIFIED REPORT

DESCRIPTORS: (U) *MIXERS(ELECTRONICS), QUANTUM ELECTRONICS, LOCAL OSCILLATORS, PHASE(ELECTRONICS), GUNN DIODES.

IDENTIFIERS: (U) Gunn oscillators.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A229 029 20/2

CALIFORNIA UNIV SANTA BARBARA DEPT OF MATERIALS

(U) Partitioning Reactions to Control and Develop Unique Microstructures.

DESCRIPTIVE NOTE: Final rept. 15 Jun 87-15 Jun 90,

SEP 90 58P

PERSONAL AUTHORS: Lange, F. F.

REPORT NO. TR-8

CONTRACT NO. AFOSR-87-0291

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1139, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Studies reported include: (1) Liquid precursor formulation, pyrolysis, compositional homogeneity, and densification, (2) Crystallization vs. compostion subsequent to pyrolysis, (3) High temperature phase partitioning of metastable structures produced during crystallization after pyrolysis, (4) Grain growth phenomena as related to different binary, solid-solution cations and composition with different binary systems, (5) Microstructural instabilities of polycrystalline thin films, (6) Microstructural instabilities of polycrystalline fibers constrained by composite matrices, (7) Formation of single crystal thin films as a function of differential composition and lattice mismatch, and (8) Relations between processing flaws and strength for fibers produced by dry spinning. The pertinent results of these studies and their interrelations are summarized. (JS)

DESCRIPTORS: (U) *CRYSTALLIZATION, CATIONS, COMPOSITE MATERIALS, COMPOSITION(PROPERTY), CONTROL, DEFECTS(MATERIALS), DENSITY, FIBERS, FORMULATIONS, GRAIN GROWTH, HIGH TEMPERATURE, HOMOGENEITY, LIQUIDS, MATRIX MATERIALS, METASTABLE STATE, MICROSTRUCTURE, POLYCRYSTALLINE, PRECURSORS, PROCESSING, PYROLYSIS,

AD-A229 029 CONTINUED

SINGLE CRYSTALS, SOLID SOLUTIONS, STRUCTURES, THIN FILMS.

AD-A229 017 11/6.1

MARYLAND UNIV COLLEGE PARK DEPT OF CHEMICAL AND NUCLEAR ENGINEERING

(U) Fundamental Studies on High Temperature Deformation, Recrystallization, and Grain Growth of Two-Phase Materials.

DESCRIPTIVE NOTE: Final 1 Sep 85-30 Nov 89,

SEP 90 87P

PERSONAL AUTHORS: Ankem, S.; Grewal, G.; Vijayshankar, M. N.

CONTRACT NO. AFOSR-85-0367

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR, XF
TR-90-1079, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Twp - phase Materials are technologically important because optimum properties can be obtained by proper combinations of phases. Among these materials, two-phase Titanium Alloys are of particular interest for high temperature aerospace applications. To design new alloys or to optimize the properties of existing Titanium alloys, it is essential to understand the deformation behavior and microstructure evolution of alpha, alpha-beta and beta Titanium alloys which is the subject of this investigation. Another aspect of this investigation is to determine the effect of strength difference between phases on deformation behavior of two-phase materials by the Finite Element Method. It was found that the flow stress drops followed by steady state behavior observed in beta titanium alloys strongly depend on pre-strain, prior heat treatments, and amount and nature of alloying elements. The flow stress drops were attributed to the multip'ication of mobile dislocations and the steady state behavior was attributed to the dynamic recovery leading to the formation of subgrains. (ttl)

DESCRIPTORS: (U) *DEFORMATION, *GRAIN GROWTH, *HIGH TEMPERATURE, *RECRYSTALLIZATION, *TITANIUM ALLOYS,

AD-A229 017 CONTINUED

AEROSPACE SYSTEMS, ALLOYS, BEHAVIOR, DISLOCATIONS, DROPS, DYNAMICS, EVOLUTION(GENERAL), FINITE ELEMENT ANALYSIS, FLOW, HEAT TREATMENT, MATERIALS, MICROSTRUCTURE, MOBILE, MULTIPLICATION, OPTIMIZATION, PHASE, PHASE STUDIES, RECOVERY, STEADY STATE, STRESSES, TWO PHASE FLOW.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A1, Alpha titanium alloys, Beta titanium alloys.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A229 015 20/4

MARYLAND UNIV COLLEGE PARK DEPT OF AEROSPACE ENGINEERING

(U) Non-Equilibrium Chemistry Effects on Hypersonic Separated Flows--Shock-Wave/Boundary-Layer Interaction.

DESCRIPTIVE NOTE: Final rept. 1 Mar 88-28 Feb 90,

SEP 90 47P

PERSONAL AUTHORS: Anderson, John D., Jr

CONTRACT NO. AFOSR-88-0107

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR, XF
TR-90-1134, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This work has addressed the question: What is the effect of nonequilibrium chemical reactions on separated hypersonic flow? The model used to generate the separate flow is a hypersonic shock wave/boundary layer interaction on a flat plate in a high enthalpy flow. The flow was calculated by means of a finite-difference, time-marching solution. The results show that nonequilibrium effects can be important in the separated flow region, and that future applications should be aware of such effects. Keywords: Separated flow, Non-equilibrium, Shock-wave/boundary layer, Boundary layer interaction. (JS)

DESCRIPTORS: (U) *BOUNDARY LAYER, CHEMICAL REACTIONS, CHEMISTRY, ENTHALPY, FLOW, FLOW SEPARATION, HIGH RATE, HYPERSONIC FLOW, INTERACTIONS, NONEQUILIBRIUM FLOW, PLATES, SEPARATION, SHOCK WAVES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2307A1.

AD-A229 013 11/2 20/11 12/2

ILLINOIS UNIV AT CHICAGO CIRCLE

(U) Mechanics of Concrete II.

DESCRIPTIVE NOTE: Final rept. May 88-Aug 90,

OCT 90 80P

PERSONAL AUTHORS: Krajcinovic, D.; Basista, M.; Sumarac, D.; Al-Ghaffar, M.

REPORT NO. CRR-91023

CONTRACT NO. AFOSR-88-0156

PROJECT NO. 2302

TASK NO. C2

MONITOR: AFOSR, XF
TR-90-1078, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This Report summarizes the results of a research program focused on the distress of cementitious composites exposed to aggressive chemical substances found in nature. It presents a comprehensive summary of constituent physico-chemical processes such as diffusion with adsorption, kinetics of chemical reactions, stresses attributable to expansive reaction products and attendant microcracking. Formulated analytical model was checked against available experimental data. The accuracy with which these data were duplicated is considered to be exemplary at this stage of the model development. (ttl)

DESCRIPTORS: (U) *CEMENTS, *COMPOSITE MATERIALS, *PHYSICOCHEMICAL PROPERTIES, *EXPOSURE(GENERAL), ACCURACY, ADSORPTION, CHEMICAL REACTIONS, CHEMICALS, EXPERIMENTAL DATA, KINETICS, MATHEMATICAL MODELS, MICROCRACKING, MODELS, REACTANTS(CHEMISTRY), STRESSES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2302C2, Cementitious composites.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A229 007 1/1

ARIZONA UNIV TUCSON DEPT OF AEROSPACE AND MECHANICAL ENGINEERING

(U) Computational Studies of Compressibility Effects on Dynamic Stall.

DESCRIPTIVE NOTE: Final rept. 1 Jun 88-31 Aug 90,

SEP 90 94P

PERSONAL AUTHORS: Fung, K.-Y.

CONTRACT NO. AFOSR-88-0163

PROJECT NO. 2307

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-1131, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The dynamic stall characteristics of several airfoils in sinusoidal pitch oscillations as well as in constant rate pitch ramps over a wide range of unsteady flow conditions have been investigated. It is found that the flow before the onset of stall can be considered quasi-steady and predicted using inviscid theory, that the effect of unsteadiness on the onset of dynamic stall depends on the airfoil geometry and whether the flow has become locally supersonic, and that the effect of the freestream Mach number on the onset is rather insensitive to the airfoil geometry. Our analysis on both experimental and numerical results predicts the presence of a separation bubble at the leading edge. It also suggests that the bursting of the bubble, or failure to reattach after the initial separation, is the onset mechanism for most of the dynamic stall cases studied. The effects of transition on bubble bursting (the onset of massive separation of dynamic stall) are studied numerically by choosing the location at which the turbulence model is switched from molecular to turbulent eddy viscosity in the numerical code. It was found that at angles of attack close to the static stall angle, minor movements in the transition point could cause a separation bubble to burst, and that bubble bursting is more susceptible to transition point location in a

AD-A229 007

AD-A229 007 CONTINUED

locally supersonic flow than a subsonic flow. Keywords: Pitch motion/oscillation; Flow separation; Mathematical models; Eddies fluid mechanics; Model tests. (EDC)

DESCRIPTORS: (U) *AIRFOILS, *FLOW SEPARATION, *OSCILLATION, *PITCH(MOTION), *STALLING, ANGLE OF ATTACK, BUBBLES, CODING, COMPRESSIVE PROPERTIES, COMPUTATIONS, DYNAMICS, EDDIES(FLUID MECHANICS), FREE STREAM, GEOMETRIC FORMS, INVISCID FLOW, LEADING EDGES, MACH NUMBER, MATHEMATICAL MODELS, MODEL TESTS, NUMERICAL ANALYSIS, POSITION(LOCATION), RAMPS, RANGE(EXTREMES), RATES, RUPTURE, SINE WAVES, STATICS, SUBSONIC FLOW, SUPERSONIC FLOW, THEORY, BOUNDARY LAYER TRANSITION, TURBULENCE, TURBULENT FLOW, UNSTEADY FLOW, VISCOSITY, VISCOUS FLOW.

IDENTIFIERS: (U) PE61102F, WUAFOSR2307A3, Sinusoidal oscillation, Separation bubbles, *Dynamic stall.

AD-A229 007

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A229 006 20/14 20/3 20/1

VIRGINIA POLYTECHNIC INST AND STATE UNIV BLACKSBURG

(U) Pulse Propagation in Random Media.

DESCRIPTIVE NOTE: Final technical rept. 1 Mar 89-30 Apr 90.

JUN 90 4P

PERSONAL AUTHORS: Kohler, Werner

CONTRACT NO. AFOSR-88-0112

PROJECT NO. 6177

TASK NO. S7

MONITOR: AFOSR, XF
TR-90-1091, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes results obtained in the study of how waves are reflected and transmitted by a randomly layered medium. Temporally pulsed energy (plane wave, beam or radiated energy from a localized source) illuminates this material. Work that was initially done for the acoustic problem has been extended to the electromagnetic problem. An extensive simulation study has confirmed the applicability of this theory. Recent work has considered radiation from a monochromatic point source in the presence of a randomly layered medium. (jhd)

DESCRIPTORS: (U) *PROPAGATION, *PULSES, ACOUSTICS, ELECTROMAGNETIC PROPERTIES, ENERGY, LAYERS, MEDIA, MONOCHROMATIC LIGHT, PLANE WAVES, RADIATION, SIMULATION, SOURCES, WAVE EQUATIONS.

IDENTIFIERS: (U) WUAFOSR617757, PE62202F.

AD-A229 005 11/6.1 8/3

GEORGIA UNIV RESEARCH FOUNDATION INC ATHENS

(U) The Corrosion Behavior of Copper-Based Materials Exposed to Natural Seawater.

DESCRIPTIVE NOTE: Annual technical rept. 1 Sep 89-31 Aug 90.

SEP 90 14P

PERSONAL AUTHORS: Britton, Bruce K.

CONTRACT NO. AFOSR-89-0515

PROJECT NO. 2313

TASK NO. A7

MONITOR: AFOSR, XF
TR-90-1147, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A computational model was used to improve the learnability of an Air Force document, doubling recall and greatly improving recruits' mental representation of the content. Kintsch's computer model of reading was applied to a 1000 word Air Force text on the Air Force's role in Vietnam War. Principles of the model were used to identify 40 text locations where recruits would have to make inferences if they were to have a coherent mental representation of the text. Each location was then repaired, and the repaired text was then tested for learnability against the original text in two experiments. In experiment 1, free recall was doubled for the repaired text. In the second experiment, 120 recruits' 66-part mental representations for 12 important text concepts were measured, and compared with the mental representations of the text's author, and of 7 independent subject matter experts. The author and the experts' mental representations correlated about .80. For recruits who read the repaired text, their mental representations correlated with the author and experts about .55 = N < 0.05. But recruits who read the original text correlated with the author and experts only about .10. These results suggest that the computational model can be used to improve the learnability of Air Force tests. Individual differences tests of inferencing

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A229 005 CONTINUED

ability were developed.

DESCRIPTORS: (U) *SEA WATER CORROSION, *CORROSION RESISTANT ALLOYS, *COPPER ALLOYS, ANODES, VOLTAGE, CALIFORNIA, CHEMICAL REACTIONS, ELECTROCHEMISTRY, LABORATORY TESTS, TIME, MASS TRANSFER, CIRCUITS, ELECTRODES, ROTATION, CALCULI.

AD-A229 004 12/3

ARIZONA STATE UNIV TEMPE DEPT OF MATHEMATICS

(U) Observability of Systems with Complicated Dynamics.

DESCRIPTIVE NOTE: Final rept. 1 Aug 88-31 Jul 90,

OCT 90 8P

PERSONAL AUTHORS: Taylor, Thomas J.

CONTRACT NO. AFOSR-88-0254

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR, XF
TR-90-1090, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Significant advances have been made in understanding the observability problem for systems with chaotic or otherwise complicated dynamics. Rigorous connections have been established between the theory of stochastic noise and observations of deterministic dynamical systems which are chaotic or otherwise display a complicated dynamical structure. New techniques have been developed for implementing state estimation of chaotic dynamical systems in the presence of observational noise. A general sufficient condition has been established for the observability of a benchmark class of chaotic dynamical systems, the Anosov diffeomorphisms. (JHD)

DESCRIPTORS: (U) *STOCHASTIC PROCESSES, DETERMINANTS(MATHEMATICS), DYNAMICS, ESTIMATES, NOISE, THEORY.

IDENTIFIERS: (U) Chaos, Anosov Diffeomorphism, Stochastic Noise.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A228 969 9/3

CALIFORNIA UNIV LOS ANGELES DEPT OF PHYSICS

(U) Computer Simulations of Radiation Generation from Relativistic Electron Beams.

DESCRIPTIVE NOTE: Final rept. 1 Oct 87-30 Sep 90,

SEP 90 71P

PERSONAL AUTHORS: Lin, Anthony T.

CONTRACT NO. AFOSR-88-0027

PROJECT NO. 2310

TASK NO. A8

MONITOR: AFOSR, XF
TR-90-1102, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) In investigating the effects of magnetic field on the output power of a plasma filled Backward Wave Oscillator, It was found that within a certain range of magnetic field the growth rate of beam plasma cyclotron interaction is significantly larger than the conventional backward wave oscillation. Computer simulations of a 100 GHz electron cyclotron autoresonance master oscillator have been carried out. Keywords: Backward wave oscillator; Cyclotron autoresonance maser. (jhd)

DESCRIPTORS: (U) *BACKWARD WAVE OSCILLATORS, *ELECTRON BEAMS, *CYCLOTRON RESONANCE, COMPUTERIZED SIMULATION, CYCLOTRONS, ELECTROMAGNETIC WAVE REFLECTIONS, GROWTH(GENERAL), INTERACTIONS, MAGNETIC FIELDS, OSCILLATION, OUTPUT, PLASMAS(PHYSICS), POWER, RADIATION, RATES, RELATIVITY THEORY.

IDENTIFIERS: (U) Magnicon Maser, PE61102F, WUAFOSR2301A8.

AD-A228 969

AD-A228 952 12/7

GEORGIA INST OF TECH ATLANTA

(U) Summary of Recent Research Accomplishments on 'Stochastic Network Processes'.

DESCRIPTIVE NOTE: Final rept. 1 May 89-30 Jun 90,

JUN 90 8P

PERSONAL AUTHORS: Serfozo, Richard F.

CONTRACT NO. AFOSR-89-0407

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR, XF
TR-90-1089, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The aim of this research has been to develop stochastic network processes for modeling the movement of discrete units in networks. Primary examples are the movement of data packets in computer networks, the movement of parts and supplies in manufacturing plants or in military support systems, and the movement of smart cars and trucks on electronically monitored highways. The distinguishing feature of our research is the emphasis on the next generation of intelligent networks that will be the backbone of our computer, military and transportation systems. Most of the present theory of stochastic network processes is for unintelligent networks in which the nodes operate independently, the routes of units are independent and the units move one at a time. In an intelligent network, however, the processing at the nodes and the routing typically depend dynamically on the actual congestion, and units move concurrently. Examples of dependencies are routing units to avoid congested nodes, speeding up of processing as queues grow, splitting and merging of units, batch processing and distributed as parallel processing. Our general goal is to provide an understanding of intelligent networks by describing their stochastic behavior. (kr)

DESCRIPTORS: (U) *COMPUTER NETWORKS, *MODELS,

AD-A228 952

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A228 952 CONTINUED

*STOCHASTIC PROCESSES, BATCH PROCESSING, HIGHWAYS, INDUSTRIAL PLANTS, MILITARY ASSISTANCE, NETWORKS, NODES, PACKETS, PARALLEL PROCESSING, PARTS, PROCESSING, QUEUEING THEORY, TRANSPORTATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A228 949 12/9

MARYLAND UNIV COLLEGE PARK

(U) Connectionist Models for Intelligent Computation.

DESCRIPTIVE NOTE: Annual technical rept. 1 Sep 88-31 Aug 89,

JUL 89 4P

PERSONAL AUTHORS: Chen, H. H.; Lee, Y. C.

REPORT NO. 0388-1

CONTRACT NO. AFOSR-87-0388

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR, XF
TR-90-1097, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) 1) Research Objectives: -- To study the underlying principles, architectures and applications of artificial neural networks for intelligent computations. 2) Approach: -- We use both numerical simulation and theoretical analysis to investigate various alternatives in connection schemes, organization principles and architectures of artificial neural networks. 3) Progress for period 9/1/88-8/31/89: -- In the past year, our research on neural network models for intelligent computing under the sponsorship of AFOSR continues to make important progress. In particular, we have constructed the Parallel Sequential Induction Network, a powerful network that self-organizes into an optimal structure to perform classification tasks. In neural network research, much attention has been paid to improving the efficiency of learning connection weights for a network with fixed topology. However, little progress has been made toward uncovering optimal designing principles to reshape the connection topology of a network adaptively to maximize the performance of a specific task. Recent studies indicate that multi-layered feedforward networks of sufficient complexity, in general, need only two hidden layers to imitate any decision hypersurface in the pattern space. (kr)

AD-A228 952

AD-A228 949

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD A228 949 CONTINUED

DESCRIPTORS: (U) *MATHEMATICAL MODELS, *NEURAL NETS, *NUMERICAL ANALYSIS, COMPUTATIONS, EFFICIENCY, INDUCTION SYSTEMS, LEARNING, MODELS, NETWORKS, OPTIMIZATION, ORGANIZATIONS, PARALLEL ORIENTATION, SEQUENCES, THEORY, TOPOLOGY.

IDENTIFIERS: (U) WUAFOSR2305B1, PE61102F.

AD-A228 946 12/3

BROWN UNIV PROVIDENCE RI LEFSCHETZ CENTER FOR DYNAMICAL SYSTEMS

(U) A Monte Carlo Method for Sensitivity Analysis and Parametric Optimization of Nonlinear Stochastic Systems: The Ergodic Case.

DESCRIPTIVE NOTE: Technical rept.,

AUG 90 51P

PERSONAL AUTHORS: Kushner, Harold J.; Yang, Jichuan

REPORT NO. LCDS-90-6

CONTRACT NO. AFOSR-89-0015, DAAL03-86-K-0171

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR, XF
TR-90-1136, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Sponsored in part by grant NSF-ECS89-13351.

ABSTRACT: (U) For high dimensional or nonlinear problems there are serious limitations on the power of available computational methods for the optimization or parametric optimization of stochastic systems of diffusion type. The paper developes an effective Monte Carlo method for obtaining good estimators of systems sensitivities with respect to system parameters, when the system is interest over a long period of time. The value of the method is borne out by numerical experiments, and the computational requirements are favorable with respect to competing methods when the dimension is high or the nonlinearities 'severe'. The method is a type of derivative of likelihood ratio method method. For a wide class of problems, the cost function or dynamics need not be smooth in the state variables; for example, where the cost is the probability of an event or sign functions appear in the dynamics. Under appropriate conditions, it is shown that the invariant measures are differentiable with respect to the parameters. Since the basic diffusion

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A228 946 CONTINUED

(or other) model cannot be simulated exactly, simulatable approximations are discussed in detail, and estimators are obtained and analyzed. It is shown that these estimators and their expectations converge to those for the original problem. Keywords: Parametric optimization of stochastic systems, Ergodic control. (KR)

DESCRIPTORS: (U) *ERGODIC PROCESSES, *MONTE CARLO METHOD, *STOCHASTIC PROCESSES, COMPUTATIONS, COSTS, DIFFUSION, DYNAMICS, FUNCTIONS, INVARIANCE, LIMITATIONS, LONG RANGE(TIME), NONLINEAR SYSTEMS, NUMERICAL METHODS AND PROCEDURES, OPTIMIZATION, PARAMETERS, PARAMETRIC ANALYSIS, POWER, REQUIREMENTS, SIZES(DIMENSIONS), VARIABLES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A1.

AD-A228 945 5/8 6/4

ILLINOIS UNIV CHAMPAIGN

(U) Towards an Integration of the Non-Invasive Methodologies of Cognitive Neuroscience: The Eleventh Carmel Workshop.

DESCRIPTIVE NOTE: Final technical rept. 3-8 Jan 90,

SEP 90 13P

PERSONAL AUTHORS: Donchin, Emanuel

REPORT NO. CPL-90-2

CONTRACT NO. AFOSR-90-0007

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR, XF
TR-90-1081, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The conference brought together investigators who use a variety of techniques designed to visualize the activity on the structure of the brain in awake behaving subjects. At issue was the manor in which the effects using these design techniques can be integrated so as to yield a more comprehensive view of the neurological basis of cognition. (TTL)

DESCRIPTORS: (U) , SYMPOSIA.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A4.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A228 940 20/2 20/5

ARIZONA UNIV TUCSON OPTICAL SCIENCES CENTER

(U) X-Ray Optics Research.

DESCRIPTIVE NOTE: Final rept. 1 Oct 87-30 Apr 90,

SEP 90 11P

PERSONAL AUTHORS: Falco, Charles M.

CONTRACT NO. AFOSR-88-0010

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR, XF
TR-90-1101, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes the production of x-ray optical elements for several wavelengths by sputtering. It describes the installation of a 'silicon/metals' molecular beam epitaxy (MBE) apparatus and its use in an extensive study of multilayer mirrors based on molybdenum and silicon. Continuing work on several additional materials is described. Finally, studies of substrate and interfacial roughness, using a scanning tunneling microscope (STM) and a WYKO phase-shifting interferometer, are presented. (TTL)

DESCRIPTORS: (U) *OPTICAL EQUIPMENT COMPONENTS, *SPUTTERING, *X RAYS, *EPITAXIAL GROWTH, FREQUENCY, INTERFACES, INTERFEROMETERS, LAYERS, MICROSCOPES, MIRRORS, MOLYBDENUM, OPTICS, PHASE SHIFT, PRODUCTION, ROUGHNESS, SCANNING, SILICON, SUBSTRATES, TUNNELING.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A1, MBE(Molecular Beam Epitaxy), STM(Scanning Tunneling Microscope).

AD-A228 939 7/4

KANSAS STATE UNIV MANHATTAN DEPT OF CHEMISTRY

(U) Excitation-Transfer Reactions from N2(A3 Sigma u+) and CO(a3II) to OH.

90 7P

PERSONAL AUTHORS: Wategaonkar, S. J.; Setser, D. W.

CONTRACT NO. AFOSR-88-0279

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XF
TR-90-1114, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physical Chemistry, v94 n18 p7200-7205, 1990.

ABSTRACT: (U) Efficient excitation transfer from N2(A) and CO(a) to OH has been observed in a room-temperature flow reactor. The excitation-transfer rate constants for OH(A2Sigma+) formation are (9.5 + or - 1.9) X 10 to the minus 11 power cc/mole/s for N2(A) and CO(a), respectively. These values suggest that excitation transfer makes the dominant contribution to the total quenching of N2(A) and CO(a) by OH. The OH(A) molecules are formed with high rotational energy. Preliminary experiments show that excitation transfer from N2(A) to CH3O occurs, but the rate constant is smaller than for OH. Quenching of N2(A) by SH and SF gave no SH(A-X) or SF(A-Z) emission. The excitation mechanism and the potential surfaces for the OH(A) excitation are qualitatively discussed. (ttl)

DESCRIPTORS: (U) , REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A228 925 20/5

TEXAS CHRISTIAN UNIV FORT WORTH DEPT OF PHYSICS

(U) Rotational and Vibrational Relaxation of Small Molecules in Porous Silica Gels.

90 8P

PERSONAL AUTHORS: Nikiel, L.; Hopkins, B.; Zerda, T. W.

CONTRACT NO. AFOSR-90-0165

PROJECT NO. 3484

TASK NO. A7

MONITOR: AFOSR, XF
TR-90-1092, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physical Chemistry, v94 n19 p7458-7464 1990.

ABSTRACT: (U) Samples of transparent silica gels of controlled porosities are produced stabilized at 800 C. Raman spectra of samples impregnated with CS2, CHCl3, CH3CN, or acetone are recorded in order to obtain rotational and vibrational correlation functions and correlation times for those liquids. The effect of pore diameters on vibrational dephasing and rotational diffusion is discussed. It is shown that surface interactions, in particular, hydrogen bonding between the imbedded molecules and silanol groups, are responsible for slowing down the rotational relaxation within small pores. A simple model for reorientational motion of molecules hydrogen bonded to the silica surface is proposed. The vibrational modulation times are obtained from the Kubo theoretical function and used to analyze molecular interactions near the silica surface. The number of silanol groups on the surface is estimated from the C=O band of acetone. Keywords: Silica ge s, rotational relaxation in pores, Reprints. (JS)

DESCRIPTORS: (U) *MOLECULE MOLECULE INTERACTIONS, ACETONES, CONTROL, CORRELATION, DIFFUSION, FUNCTIONS, FUNCTIONS(MATHEMATICS), GELS, HYDROGEN, HYDROGEN BONDS, INTERACTIONS, MODULATION, MOLECULES, MOTION, ORIENTATION(DIRECTION), POROSITY, POROUS MATERIALS, RAMAN

AD-A228 925

AD-A228 925 CONTINUED

SPECTRA, RELAXATION, REPRINTS, ROTATION, SAMPLING, SILICON DIOXIDE, SURFACES, TRANSPARENCE, VIBRATION.

IDENTIFIERS: (U) PE61103D, WUAFOSR3484A7.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A228 923 12/3

ILLINOIS UNIV AT URBANA DEPT OF AERONAUTICAL AND ASTRONAUTICAL ENGINEERING

(U) Stochastic Dynamics and Bifurcation Behavior of Nonlinear Nonconservative Systems in the Presence of Noise.

DESCRIPTIVE NOTE: Final technical rept. 1 Aug 88-31 Jul 90,

AUG 90 232P

PERSONAL AUTHORS: Namachchivaya, N. S.; Leng, Gerard; Tien, Winmin; Doyle, Monica; Talwar, Sanjiv

REPORT NO. AAE-90-7, UILU-ENG-90-0507

CONTRACT NO. AFOSR-88-0233

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR, XF
TR-90-1143, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The main objectives of the completed work are to develop mathematical techniques to reduce the dimensionality of multidegree-of-freedom nonlinear systems near bifurcation points and to solve for the response statistics of the reduced system. The asymptotic behavior of nonlinear dynamical systems in the presence of noise is studied using the method of stochastic normal forms. The crucial point in the normal form computations is to find the resonant terms that cannot be eliminated through a nonlinear change of variables. Subsequent to reduction of the dimensionality, a Markovian approximation is used to obtain the associated stochastic normal forms. The key result is that the second order stochastic terms have to be retained in the normal form computations in order to capture the contributions of the stable modes stochastic components to the critical modes drift terms. It is also shown that the method of extended stochastic averaging is in fact 'equivalent' to stochastic normal forms for a specified class of nonlinear systems. In addition, mean square stability of the response is obtained and the bifurcation behavior and associated stationary and transient probability density functions for the reduced stochastic system are determined. Finally, the general results are applied to the study of the dynamics of aircraft at high angles of attack, plates under gas flow, structures under follower forces, and propellant lines conveying pulsating fluid. (JHD)

DESCRIPTORS: (U) *DYNAMICS, *MARKOV PROCESSES, *MATHEMATICAL ANALYSIS, AIRCRAFT, ASYMPTOTIC SERIES, COMPUTATIONS, DRIFT, FLUIDS, GAS FLOW, HIGH ANGLES, MEAN, NONLINEAR SYSTEMS, PROBABILITY DENSITY FUNCTIONS, PULSES, REDUCTION, RESONANCE, RESPONSE, STABILITY, STATISTICS, STOCHASTIC PROCESSES, VARIABLES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2302B1, Bifurcation Theory.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A228 922 6/1

SAN FRANCISCO STATE UNIV CA

(U) Macromolecular Association of ADP-Ribosyltransferase and Its Correlation with Enzymic Activity,

90 11P

PERSONAL AUTHORS: Bauer, Pal I.; Buki, Kalman G.; Hakam, Alaeddin; Kun, Ernest

CONTRACT NO. AFOSR-89-0231

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR, XF
TR-90-1118, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The macromolecular self-association of ADP-ribosyltransferase protein in solution was studied by several experimental techniques: quantitative gel filtration, electrophoretic analyses in non-denaturing gels, and cross-linking the enzyme protein with glutaraldehyde, dimethyl pimelimidate, dimethyl subermidate, dimethyl 3,3'-dithiobisproprionimidate and tetranitromethane. The self-association of the polypeptide components obtained by plasmin digestion was also determined by using the above cross-linking agents. Monomers and cross-linked dimers of the enzyme protein, possessing enzymic activity, were separated in non-denaturing gels by electrophoresis. The basic polypeptide fragments, exhibiting molecular masses of 29 kDa and 36 kDa, self-associated, whereas the polypeptides with molecular masses of 56 kDa and 42 kDa associated only to a negligible extent, indicating that the peptide regions that also bind DNA and histones are probable sites of self-association in the intact enzyme molecule. Macromolecular association of the enzyme was indicated by a protein-concentration-dependent red-shift in protein fluorescence. The specific enzymic activity of the isolated ADP-ribosyltransferase depended on the concentration of the enzyme protein, and at 2.00 micrometers concentration the enzyme was self-inhibitory. Dilution of the enzyme protein to 20-40nM resulted in a large increase in its specific activity. Further dilution to 1-3 nM coincided with a marked decrease of specific activity. Reprints. (JS)

DESCRIPTORS: (U) *ENZYMES, *PROTEINS, CHEMICAL AGENTS, CROSSLINKING(CHEMISTRY), DEOXYRIBONUCLEIC ACIDS, DIGESTION(BIOLOGY), DIMERS, ELECTROPHORESIS, FILTRATION, FLUORESCENCE, GELS, HISTONES, MACROMOLECULES, MOLECULES, MONOMERS, NITROMETHANE, PEPTIDES, PLASMIN, POLYMERS, REGIONS, REPRINTS, TEST METHODS, TETRYL.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A228 920 20/4 20/13

PURDUE UNIV LAFAYETTE IN SCHOOL OF MECHANICAL ENGINEERING

(U) Effects of Free Stream Turbulence on Heat Transfer.

DESCRIPTIVE NOTE: Final rept. 1 Apr 87-31 Jul 90,

SEP 90 93P

PERSONAL AUTHORS: Murthy, S. N.; Bradshaw, P.

REPORT NO. AFW/M-B/90-1

CONTRACT NO. F49620-87-K-0008

PROJECT NO. 2307

TASK NO. A4

MONITOR: AFOSR TR-90-1152

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Stanford Univ.

ABSTRACT: (U) The Report presents the research (including relevant publications) undertaken at Purdue University and, under subcontract, at Imperial College, London, on analytical-computational and experimental studies on the determination of the influence of inhomogeneous and isotropic turbulence on boundary layers, including cases with heat transfer. The modelling of the influence of Free Stream Turbulence on boundary layer turbulence (BLT) has been based on the so-called large eddy interaction hypothesis, wherein the interaction between a representative large eddy and all of the eddies is related to a skewness factor and a damping factor. The boundary layer is divided into four asymptotically matched regions, including the free stream, and the flowfield is calculated based on the necessary (as proved herein) assumption of the existence of a logarithmic law region adjoining the wall viscous region. A detailed comparison between the experimental data Hancock and Bradshaw and the predictions obtained for the same case of interaction between FST and BLT is a fully-developed TBL is presented and provides substantial credibility to

AD-A228 920

AD-A228 920 CONTINUED

the method of approach. The experimental work at Imperial College has been devoted to a study of the effects of anisotropic FST on heat transfer in low speed TBL. (kr)

DESCRIPTORS: (U) *FREE STREAM, *HEAT TRANSFER, *TURBULENT BOUNDARY LAYER, BOUNDARY LAYER, DAMPING, EDDIES(FLUID MECHANICS), EDDY CURRENTS, EXPERIMENTAL DATA, FLOW FIELDS, INTERACTIONS, ISOTROPISM, LOGARITHM FUNCTIONS, LOW VELOCITY, MATCHING, REGIONS, SKEWNESS, TURBULENCE, VISCOUS FLOW, WALLS.

IDENTIFIERS: (U) WUAFOSR2307A4, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A228 908 7/3

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) A New Trifluorosilyl Exchange Reagent: Reactions of Cd(SiF3)2.glyme (glyme = dimethoxyethane) with Dibromo Metal Phosphine Complexes of Platinum, Palladium, and Nickel yield Trifluorosilyl Substituted Dialkyl Compounds.

90 4P

PERSONAL AUTHORS: Guerra, Miguel A.; Lagow, Richard J.

CONTRACT NO. AFOSR-88-0084

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-90-1093, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the Chemical Society, Chemical Communications, n1 p65-66 1990.

ABSTRACT: (U) The reaction of excess Cd(SiF3)2.glyme (glyme = dimethoxyethane) with trimethylphospine metal dibromides of platinum, palladium, and nickel yielded the trifluorosilyl substituted dialkyl compounds trans-Pt(SiF3)2(PMe3)2, Pd(SiF3)2(PMe3)2, and Ni(SiF3)2(PMe3)3. (TTL)

DESCRIPTORS: (U) , NICKEL, PALLADIUM, PLATINUM.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2, Trifluorosilyl, Dimethoxyethane.

AD-A228 879 7/6

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) A Synthesis for SF(5) Substituted Fluorocarbon Polymers.

90 5P

PERSONAL AUTHORS: Kawa, H.; Partovi, S. N.; Ziegler, B. J. ; Lagow, R J.

CONTRACT NO. AFOSR-88-0084

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-90-1095, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Polymer Science: Part C: Polymer Letters, v28 p297-300 1990.

ABSTRACT: (U) Synthesis of both hydrocarbon and perfluorocarbon vinyl polymers containing the SF5 group have been accomplished by the reaction of elemental fluorine with poly (S-vinyl-O-t-butylthiocarbonate). The resulting linear polymers have pendant SF5 groups with similar structures to polytetrafluoroethylene and polyethylene. Keywords: Fluorocarbon polymers, Sulfur pentafluoried, Electric insulators, Polymers. (JS)

DESCRIPTORS: (U) *POLYMERS, ELECTRIC POWER, FLUORINATED HYDROCARBONS, FLUOROPOLYMERS, HYDROCARBONS, INSULATION, LINEAR SYSTEMS, POLYETHYLENE, STRUCTURES, SULFUR, SYNTHESIS, TETRAFLUOROETHYLENE RESINS, VINYL PLASTICS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A228 877 12/5 20/11

CORNELL UNIV ITHACA NY DEPT OF STRUCTURAL ENGINEERING

(U) Probabilistic Fracture Mechanics: A Validation of Predictive Capability.

DESCRIPTIVE NOTE: Final rept. 4 Jan 87-30 Dec 89,

AUG 90 155P

PERSONAL AUTHORS: Ingraffea, Anthony R.; Grigoriu, Mircea

REPORT NO. 90-8

CONTRACT NO. F49620-87-C-0054

PROJECT NO. 2302

TASK NO. C2

MONITOR: AFOSR, XF
Tr-90-1074, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A two-phase task was undertaken to the Probabilistic Fracture Analysis Code (PROFRANC) developed under this project. Phase one consisted in predicting deterministically the outcome of a subset of a larger number of experiments in which variability in geometry and material parameters was purposely minimized. The purpose of this phase was to verify that PROFRANC could predict nearly deterministic events accurately. This phase was shown to be highly successful. This verification was based on experimental results which had to be obtained within this project due to a paucity of comprehensive mixed-mode fracture propagation data in the open literature. In Phase two all currently available data involving inherent uncertainties in some material and geometrical parameters was assembled in a probabilistic framework and subsequently compared to the probabilistic predictions of PROFRANC qualitatively and quantitatively. Theses comparisons were shown to be very successful. The quantitative comparison was performed by hypothesis testing, which is a mathematical rule deciding whether to except or reject PROFRANC predictions using experimental data. (kr)

DESCRIPTORS: (U) *COMPUTER PROGRAM VERIFICATION,

AD-A228 877

AD-A228 877 CONTINUED

*FRACTURE(MECHANICS), CODING, COMPARISON, DETERMINANTS(MATHEMATICS), EXPERIMENTAL DATA, GEOMETRY, HYPOTHESES, MATERIALS, PARAMETERS, PREDICTIONS, PROBABILITY, TEST AND EVALUATION, THESES, TWO PHASE FLOW, VALIDATION, VERIFICATION.

IDENTIFIERS: (U) WUAFOSR2302C2, PE61102F, PROFRANC(Probalistic Fracture Analysis Code).

AD-A228 877

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A228 876 7/2 7/3 20/5

STATE UNIV OF NEW YORK AT BUFFALO RESEARCH FOUNDATION

(U) Design, Ultrastructure and Dynamics of Nonlinear Optical Interactions in Polymeric Thin Films.

DESCRIPTIVE NOTE: Final technical rept. 1 Mar 87-30 Mar 90.

OCT 90 26P

PERSONAL AUTHORS: P.asad, Paras N.

CONTRACT NO. F49620-87-C-0042

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-1066, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This program covered microscopic theory of optical nonlinearity, design and synthesis of novel structures, materials processing for guided waves, measurements of optical nonlinearities and study of device processes. Both classical anharmonic oscillator approach as well as ab-initio calculations to understand the microscopic nature of optical nonlinearities in organic structures had been described. The ultimate goal is to understand the structure-property relationship so that one may be able to predict structures with enhanced optical nonlinearities. The focus of our work has been on third-order optical nonlinearity. We developed a simple model of coupled locally an harmonic oscillators which can be used to describe the optical nonlinearities in conjugated organic monomeric, oligomeric and polymeric structures. We showed that the method can very readily be used to explain the dependence of the band gap, the polarizability, alpha, and the second hyperpolarizability, gamma, as a function of the number of repeat units for the oligomers of thiopene and benzen. The results predicted by the coupled anharmonic oscillator model are in good agreement with those of the experimental studies of thiophene and benzene oligomers recently reported by our group. In addition, the predicted power dependences of orientationally averaged (alpha) and (gamma) on the number of repeat units were compared with those predicted by a free electron model, PPP methods, sum-over-states method and ab initio calculations. (TTL)

AD-A228 876 CONTINUED

DESCRIPTORS: (U) BENZENE, *OPTICAL PROPERTIES, *POLYMERIC FILMS, *THIN FILMS, *THIOPHENES, ANHARMONIC OSCILLATORS, COUPLING(INTERACTION), DYNAMICS, EXPERIMENTAL DATA, FREE ELECTRONS, GUIDANCE, HARMONIC GENERATORS, INTERACTIONS, MATERIALS, MODELS, MOLECULAR STRUCTURE, NONLINEAR SYSTEMS, OLIGOMERS, PHYSICAL PROPERTIES, POLARIZATION, POLYMERS, PROCESSING, STRUCTURES, SYNTHESIS, WAVEFORMS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3, Optical nonlinearities, Harmonic oscillators.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO EVI59A

AD-A228 873 12/7 12/5

STANFORD UNIV CA

(U) *Research into the Design and Implementation of Knowledge Base Systems.*

DESCRIPTIVE NOTE: Final rept. 1 Aug 88-31 Jul 90.

JUL 90 8P

PERSONAL AUTHORS: Ullman, Jeffrey D.

CONTRACT NO. AFOSR-88-0266

PROJECT NO. 2304

TASK NO. A7

MONITOR: AFOSR, XF
TR-90-1106, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The general goal of the work has been to develop the techniques needed to process queries, expressed as logic programs, efficiently. A system called NAIL was developed, bu mid-1989, to test out our ideas. It was fully declarative, which we found an interesting challenge, and its implementation exposed a number of issues that lead to important new ideas and research. However, the full declarativeness proved too much of a burden in writing some applications that we hoped would be facilitated by a logic/database language, and NAIL was abandoned in favor of a new language, called GLUE, that is logical, but that allows for controlled-flow, sets as data values, aggregation operators such as sums of average. NAIL now serves as the view facility for GLUE, and we are in the process of writing a NAIL-to-GLUE translator that will offer both nondeclarative capabilities of GLUE and the declarative capabilities of NAIL, whichever is more appropriate in a given situation. (Author) (kr)

DESCRIPTORS: (U) *KNOWLEDGE BASED SYSTEMS, *SYSTEMS ENGINEERING, *PROGRAMMING LANGUAGE, DATA BASES, INTERROGATION, LOGIC.

IDENTIFIERS: (U) WUAFOSR2304A7, PE62202F, GLUE programming language.

AD-A228 873

AD-A228 872 20/6.1 25/3

COLORADO UNIV AT BOULDER

(U) Applications of Non-Linear Optics.

DESCRIPTIVE NOTE: Final rept. 1 Mar 87-28 Feb 90,

FEB 90 20P

PERSONAL AUTHORS: Anderson, Dana Z.

CONTRACT NO. AFOSR-87-0163

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR, XF
TR-90-1103, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Spatial mode-multiplexing is used to transmit several communication channels on a single multimode optical fiber. Each channel is encoded by an orthogonal pattern produced by a spatial light modulator. A photorefractive medium holographically decodes the output speckle pattern at a receiver station. A ring and star architectures for interconnection networks is demonstrated. Typical crosstalk to signal ratios, for fully interconnected 3 processor networks, are -24 and -26 dB for the ring and star respectively. Keywords: Fiber optics; Optical communications. (RH)

DESCRIPTORS: (U) *SPATIAL FILTERING, *FIBER OPTICS, *LIGHT MODULATORS, *OPTICAL COMMUNICATIONS, *NONLINEAR OPTICS, CHANNELS, CIRCUIT INTERCONNECTIONS, CROSSTALK, MULTIPLEXING, MULTIMODE, NETWORKS, NONLINEAR SYSTEMS, ORTHOGONALITY, OUTPUT, PATTERNS, RATIOS, RECEIVERS, SIGNALS, SPATIAL DISTRIBUTION, SPECULAR REFLECTION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A1.

AD-A228 872

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A228 842 9/1

CALIFORNIA UNIV LOS ANGELES DEPT OF ELECTRICAL ENGINEERING

(U) Multiple Optical Probing of High Frequency Semiconductor Devices.

DESCRIPTIVE NOTE: Final rept. 15 Nov 88-14 Nov 89,

NOV 89 48P

PERSONAL AUTHORS: Fetterman, Harold

CONTRACT NO. AFOSR-89-0111

PROJECT NO. 3842

TASK NO. A6

MONITOR: AFOSR, XF
TR-90-1129, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The purchase was made of a complete Nd: YAG pumped picosecond dye laser and related optical components. Matching support was provided for an autocorrelator, power meters, lock-in detectors and Optical Table to form a complete measurement system. The idea was to fabricate a picosecond system which would measure devices and systems out to at least 200 GHz. It would be used to validate Network analyzer measurements in the region of overlap and to develop a degree of confidence in the entire technique of S parameter measurement using picosecond pulses. The highest frequency GaAs and GaAs alloy devices were investigated. New types of devices, MMIC amplifiers and finally the operational constraints of optical interconnections were studied. The system proved to be so useful that we actually performed to be so useful that we actuall performed all of these tests and have extended these measurements to the generation of millimeter radiation and the demonstration of spectroscopic use. Current measurements are on ballistic field effect devices and resonant tunneling structures which have been fabricated by local industries and universities directly as a result of this unique measurement capability. (rh)

DESCRIPTORS: (U) *PULSED LASERS, *LIGHT PULSES, *PROBES,

AD-A228 842

AD-A228 842 CONTINUED

ALLOYS, ANALYZERS, BALLISTICS, CIRCUIT INTERCONNECTIONS, CONFIDENCE LEVEL, DEMONSTRATIONS, DETECTORS, DYE LASERS, GALLIUM ARSENIDES, HIGH FREQUENCY, MATCHING, MEASUREMENT, MILLIMETER WAVES, NETWORKS, OPTICAL CIRCUITS, OPTICAL EQUIPMENT, OPTICAL PROPERTIES, OVERLAP, PARAMETERS, POWER METERS, LASER PUMPING, RESONANCE, SEMICONDUCTOR DEVICES, SPECTROSCOPY, STRUCTURES, TABLES(DATA), TUNNELING(ELECTRONICS), YTTRIUM ALUMINUM GARNET.

IDENTIFIERS: (U) PE61104D, WUAFOSR23842A6, Nd:YAG Lasers.

AD-A228 842

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A228 841 12/9

CALIFORNIA INST OF TECH PASADENA

(U) Optoelectronic Realizations of Neural Network Models.

DESCRIPTIVE NOTE: Final technical rept. 1 Aug 88-28 Feb 90,

OCT 90 22P

PERSONAL AUTHORS: Yariv, Amnon; Agranat, A.; Neugebauer, C.; Leyva, V.

CONTRACT NO. F49620-88-C-0112, DARPA Order-6485

MONITOR: AFOSR, XF
TR-90-1068, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This research project is aimed at developing silicon based implementations of neural network models. The main advantages of our approach are its use of standard, present day technology and its highly memory due to the use of optics. Two different embodiments of the electronic part of the neural processor have been realized. A phototransistor based network using standard complementary metal oxide semiconductors technology has been built and tested. The CCD version of the optoelectronic architecture has been fabricated and tested, proving the viability of this architecture. All electronic loading has been explored and offers possibilities of rugged, compact systems. (KR)

DESCRIPTORS: (U) *ELECTROOPTICS, *NEURAL NETS, ARCHITECTURE, DAY, LOADING(ELECTRONICS), MODELS, NERVOUS SYSTEM, NETWORKS, COMPLEMENTARY METAL OXIDE SEMICONDUCTORS, OPTICS, PHOTOTRANSISTORS, PROCESSING EQUIPMENT, RUGGEDIZED EQUIPMENT, SILICON.

IDENTIFIERS: (U) PE61102F.

AD-A228 840 9/1 12/9

NORTH CAROLINA AGRICULTURAL AND TECHNICAL STATE UNIV GREENSBORO

(U) Application of Error Correcting Codes in Fault-Tolerant Logic Design for VLSI Circuits.

DESCRIPTIVE NOTE: Annual rept. 1 Jun 89-31 May 90,

MAY 90 21P

PERSONAL AUTHORS: Lala, P. K.; Martin, H. L.

CONTRACT NO. F49620-89-C-0069

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR, XF
TR-90-1065, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) It is now generally accepted that not all faults in VLSI logic can be represented by the stuck-at-0 and stuck-at-1 models used at the gate level. In order to ensure realistic modeling, faults should be considered at the transistor level, since only at the level the complete circuit structure is known. In other words, test for circuits should be derived based on possible 'shorts' and 'opens' at the transistor level. A stuck-open or stuck-closed transistor can be modeled by replacing the faulty transistor with an open connection or a direct short respectively between the transistor's source and drain. (rh)

DESCRIPTORS: (U) *ERROR CORRECTION CODES, *FAULTS, *GATES(CIRCUITS), *LOGIC, *TRANSISTORS, CIRCUITS, SOURCES, TOLERANCE.

IDENTIFIERS: (U) WAUFOSR2305B1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A228 838 4/1

MASSACHUSETTS INST OF TECH CAMBRIDGE CENTER FOR SPACE RESEARCH

(U) Particle Acceleration by Electromagnetic Ion Cyclotron Turbulence,

89 37P

PERSONAL AUTHORS: Crew, G. B.; Chang, Tom

CONTRACT NO. F19628-86-K-0005, F19628-88-K-0008

PROJECT NO. 3484

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1063, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physics of Space Plasmas, SPI Conference Proceedings and Reprint Series, n9 p31-66 1989.

ABSTRACT: (U) Low frequency electromagnetic turbulence is proving to be an important source of energy for the acceleration of ions in various regions of the Earth's magnetosphere. In particular it has been shown to account for some of the energetic oxygen conics found in the auroral regions, and a convincing case is being built for its role in the cusp/cleft region of the magnetosphere. The transfer of energy from the waves to the particles is efficiently accomplished through ion cyclotron resonance with the left-hand polarized component of the turbulence, and the result of the interaction is a heating of the particle distribution In this tutorial review, we shall present a general theoretical treatment of ion cyclotron resonance heating in a weakly inhomogeneous magnetic geometry and then proceed to examine the formation of auroral ion conics in somewhat greater detail. For the auroral case, the properties of the electric field spectral density and the Earth's dipolar magnetic field allow the introduction of a similarity transformation which results in a considerable simplification of the analysis for the altitude asymptotic form of the conic distribution. The merit of this approach is that it makes it possible to directly compare the theory with observations, and the agreement is found to be excellent.

AD-A228 838

AD-A228 838 CONTINUED

Reprints. (JHD)

DESCRIPTORS: (U) *ACCELERATION, *AURORAE, *CYCLOTRON WAVES, *IONS, *MAGNETOSPHERE, CYCLOTRON RESONANCE, DIPOLES, DISTRIBUTION, EARTH(PLANET), ELECTRIC FIELDS, ELECTROMAGNETISM, ENERGY, ENERGY TRANSFER, HEATING, INTERACTIONS, LOW FREQUENCY, MAGNETIC FIELDS, POLAR REGIONS, POLARIZATION, REPRINTS, SOURCES, SPECTRAL ENERGY DISTRIBUTION, TURBULENCE, WAVES.

IDENTIFIERS: (U) PE61103D, WUAFOSR3484A2, Ion conics, Conical Distribution Fucntions, Ion Cyclotron Waves.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A228 801 4/2

COLORADO STATE UNIV FORT COLLINS DEPT OF ATMOSPHERIC SCIENCE

(U) The Relevance of the Microphysical and Radiative Properties of Cirrus Clouds to Climate and Climatic Feedback,

JUL 90 13P

PERSONAL AUTHORS: Stephens, Graeme L.; Tsay, Si-Chee; Stackhouse, Paul W., Jr.; Flatau, Piotr J.

CONTRACT NO. AFOSR-88-0143

PROJECT NO. 2310

TASK NO. A1

MONITOR: AFOSR, XF
TR-90-1113, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the Atmospheric Sciences, v47 n14 p1742-1753, 15 Jul 90.

ABSTRACT: (U) This reprint examines the effects of the relationship between cirrus cloud ice water content and cloud temperature on climate change. A simple mechanistic climate model is used to study the feedback between ice water content and temperature. The central question studied in this paper concerns the extent to which both the radiative and microphysical properties of cirrus cloud influence such a feedback. To address this question, a parameterization of the albedo and emissivity of clouds is introduced. Observations that relate the ice water content to cloud temperature are incorporated in the parameterization to introduce a temperature dependence to both albedo and emittance. The cloud properties relevant to the cloud feedback are expressed as functions of particles size r sub e, asymmetry parameter g and cloud temperature and analyses of aircraft measurements, lidar and ground based radiometer data are used to select r sub e and g. It was shown that scattering calculations assuming spherical particles with a distribution described by r sub e = 16 microns reasonably matched the lidar and radiometer data. However, comparison of cloud radiation properties measured from aircraft to those

AD-A228 801 CONTINUED

parameterized in this study required values of g significantly smaller than those derived for spheres but consistent with out understanding of non-spherical particle scattering. Keywords: Cloud microphysics; Radiative transfer. (kr)

DESCRIPTORS: (U) *CIRRUS CLOUDS, *CLOUD PHYSICS, *MOISTURE CONTENT, *RADIATION PATTERNS, AIRCRAFT, ALBEDO, ATMOSPHERE MODELS, CLIMATE, CLOUDS, COMPUTATIONS, EMISSIVITY, FEEDBACK, GROUND BASED, ICE, MEASUREMENT, NUCLEAR SCATTERING, OPTICAL RADAR, PARTICLES, RADIATIVE TRANSFER, RADIOMETRY, REPRINTS, SCATTERING, SIZES(DIMENSIONS), SPHERES, TEMPERATURE, THERMAL PROPERTIES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2310A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A228 797 9/5

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES SIGNAL AND IMAGE PROCESSING INS T

(U) Research in Optical Symbolic Tasks.

DESCRIPTIVE NOTE: Final technical rept. 1 Jun 86-29 Nov 89,

NOV 89 151P

PERSONAL AUTHORS: Jenkins, Keith

CONTRACT NO. AFOSR-86-0196

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR, XF
TR-90-1130, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The research findings of the AFOSR Grant AFOSR-86-0196, Optical Symbolic Computing Tasks are summarized. The grant period was 1 June 1986 - 29 November 1989. Specifically, we have concentrated on the following topics: complexity studies for optical neural and digital systems, architecture and models for optical computing, learning algorithms for neural networks and applications of neural networks for early vision problems such as image restoration, texture segmentation, computation of optical flow and stero. A number of conference and journal papers reporting the research findings have been published. A list of publications and presentation is given at the end of the report along with a set or reprints. (kr)

DESCRIPTORS: (U) *COMPUTATIONS, *OPTICAL PROCESSING, ALGORITHMS, DIGITAL SYSTEMS, FLOW, IMAGE RESTORATION, LEARNING, NERVOUS SYSTEM, NEURAL NETS, OPTICAL EQUIPMENT, OPTICAL PROPERTIES, REPRINTS, SEGMENTED, SYMBOLS, SYMPOSIA, TEXTURE, VISION.

IDENTIFIERS: (U) WUAFOSR2305B1.

AD-A228 797

AD-A228 773 3/2

JOHNS HOPKINS UNIV LAUREL MD APPLIED PHYSICS LAB

(U) Center for Applied Solar Physics.

DESCRIPTIVE NOTE: Final rept. 1 Dec 86-30 Apr 90,

APR 90 16P

PERSONAL AUTHORS: Rust, David M.

CONTRACT NO. AFOSR-87-0077

PROJECT NO. 3484

TASK NO. A6

MONITOR: AFOSR, XF
TR-90-1111, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) New instruments have been installed at observatories in New Mexico and California for measuring solar magnetic fields and surface velocities. The magnetic fields provide the energy for all eruptive and accelerative processes on the Sun, and the surface velocities reveal the dynamics of the solar interior. Early detection of emerging magnetic fields may given several hours' warning of impending solar flares and interplanetary shocks. The new instruments incorporate several technical innovations, including lithium niobate filter for high spectral resolution. With this filter, circular and linear polarization and Doppler shifts are measured in solar spectral lines to yield estimates of the magnetic field vector in active sunspot regions. A program of daily measurements is planned for study of the current peak in the 11-year solar cycle. Keywords: Sunspots, Solar magnetic fields, Surface velocities. (JHD)

DESCRIPTORS: (U) *SOLAR PHYSICS, *MAGNETIC FIELDS, *FORECASTING, *SUNSPOTS, ACCELERATION, CIRCULAR, DAILY OCCURRENCE, DETECTION, DOPPLER EFFECT, DYNAMICS, ESTIMATES, OPTICAL FILTERS, HIGH RESOLUTION, INSTRUMENTATION, LINEAR POLARIZATION, LITHIUM NIOBATES, MEASUREMENT, PEAK VALUES, REGIONS, SOLAR FLARES, SOLAR SPECTRUM, SPECTRA, SPECTRAL LINES, SUN, SURFACES, VELOCITY, WARNING SYSTEMS, YIELD.

AD-A228 773

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO EVI59A

AD-A228 773 CONTINUED

IDENTIFIERS: (U) WUAFOSR3484A6, PE61102D.

AD-A228 768 4/1

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) The Electron Beam Instability and Turbulence Theories.

89 31P

PERSONAL AUTHORS: Dum, C. T.

CONTRACT NO. F49620-86-C-0128

PROJECT NO. 3484

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1084, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physics of Space Plasmas, SPI Conference Proceedings and Reprint Series, n9 p67-96 1989.

ABSTRACT: (U) The excitation of Langmuir waves by a gentle bump-on-tail has become the classic example for a kinetic instability. Must turbulence theories, ranging from quasi-linear theory to strong turbulence, have also been developed starting from this model. We discuss the practical application and the extension of these theories to recent observations of electron beam-plasma interactions. Observations in the electron foreshock, in particular, show that linear instability theory must be extended to also describe the excitation of waves with frequencies substantially different from the plasma frequency. New questions about turbulence theories are then raised. The departure point for any extensions should be a quantitative test of existing theories, starting from linear instability theory for the actual non-Maxwellian distribution functions and other features predicted by quasi-linear theory. Particle simulations allowing for such tests are described. It is the unique advantage of simulation studies that more physics can be added step by step. This procedure is used to differentiate between various nonlinear turbulence effects. Reprints. (JHD)

DESCRIPTORS: (U) *ELECTRON BEAMS, *IONOSPHERIC DISTURBANCES, *PLASMA WAVES, EXCITATION, INTERACTIONS, KINETICS, LANGMUIR PROBES, LINEARITY, NONLINEAR SYSTEMS,

AD-A228 773

AD-A228 768

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A228 768 CONTINUED

PARTICLES, PLASMAS(PHYSICS), REPRINTS, SIMULATION, STABILITY, TEST AND EVALUATION, THEORY, TURBULENCE.

IDENTIFIERS: (U) PE61103D, WUAFOSR3484A2, Langmuir Plasmas, Plasma Instabilities, Langmuir Waves.

AD-A228 768

AD-A228 767 4/1

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Heating of Ion Conics in the Cusp/Cleft,

89 12P

PERSONAL AUTHORS: Andre, Mats; Crew, G. B.; Peterson, W. K.; Persoon, A. M.; Pollock, C. J.

CONTRACT NO. F49620-86-C-0128

PROJECT NO. 3484

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1085, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physics of Space Plasmas, SPI Conference Proceedings and Reprint Series, n9 p203-213 1989.

ABSTRACT: (U) Ion conic distributions are often observed in the cusp/cleft region of the dayside magnetosphere. We show that these ions can be heated by resonant interactions with broadband low-frequency (near the ion gyrofrequency) waves. Data from one cusp/cleft crossing of the polar orbiting DE-1 satellite is studied in detail. Observed cool O+ distributions and observed wave intensities are used as input to a Monte Carlo simulations. The theoretically obtained hot O+ distributions are in good agreement with the corresponding observed distributions. This resonant heating by broadband low-frequency waves is important for the outflow of ionospheric ions into the magnetosphere. Reprints. (JHD)

DESCRIPTORS: (U) *IONOSPHERIC DISTURBANCES, *MAGNETOSPHERE, BROADBAND, DISTRIBUTION, OXYGEN, HEATING, INTENSITY, INTERACTIONS, IONS, LOW FREQUENCY, MONTE CARLO METHOD, REPRINTS, RESONANCE, SIMULATION, RADIO WAVES.

IDENTIFIERS: (U) Ion Conics, Ion Cyclotron Waves, PE61103D, WUAFOSR3484A2.

AD-A228 767

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A228 766 4/1

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Simulation Studies of Plasma Waves in the Electron Foreshock: The Generation of Downshifted Oscillations,

JUN 90 9P

PERSONAL AUTHORS: Dum, C. T.

CONTRACT NO. AFOSR-90-0085

PROJECT NO. 3484

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1108, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Geophysical Research, v95 nA6, p8123-8131, 1 Jun 90.

ABSTRACT: (U) The generation of waves with frequencies downshifted from the plasma frequency, as observed in the electron foreshock, is analyzed by particle simulation. Wave excitation differs fundamentally from the familiar excitation of the plasma eigenmodes by a gentle bump-on-tail electrons distribution. Beam modes are destabilized by resonant interaction with bulk electrons, provided the beam velocity spread is very small. These modes are stabilized, starting with the higher frequencies, as the beam is broadened and slowed down by the interaction with the wave spectrum. Initially, a very cold beam is also capable of exciting frequencies considerably above the plasma frequency, but such oscillations are quickly stabilized. Low-frequency modes persist for a long time, until the bump in the electron distribution is completely 'ironed' out. This diffusion process also is quite different from the familiar case of well-separated beam and bulk electrons. A quantitative analysis of these processes is carried out. Keywords: Reprints; Plasma waves; Electron foreshock; Simulation; Downshifted oscillations; Diffusion; Electron beam. (JHD)

DESCRIPTORS: (U) *IONOSPHERIC DISTURBANCES, *PLASMA OSCILLATION, *PLASMA WAVES, DIFFUSION, DISTRIBUTION, EIGENVECTORS, ELECTRON BEAMS, ELECTRONS, EXCITATION,

AD-A228 766

AD-A228 766 CONTINUED

INTERACTIONS, LOW FREQUENCY, LOW TEMPERATURE, PARTICLES, PLASMAS(PHYSICS), QUANTITATIVE ANALYSIS, REPRINTS, RESONANCE, SIMULATION, SPECTRA, VELOCITY, WAVES.

IDENTIFIERS: (U) Electron Foreshock, PE61103D, WUAFOSR3484A2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A228 764 4/1

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Particle Acceleration by Intense Auroral VLF Turbulence,

89 43P

PERSONAL AUTHORS: Retterer, John M.; Chang, Tom; Jasperse, J. R.

CONTRACT NO. F49620-86-C-0128

PROJECT NO. 3484

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1067, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physics of Space Plasmas, SPI Conference Proceedings and Reprint Series, n9 p119-160 1989.

ABSTRACT: (U) Broadband turbulence in the lower-hybrid to plasma frequency range is found in a variety of forms in the supraauroral region, must notably as auroral his and VLF saucers. When the turbulence is intense, it is observed to be associated with ion conics (ions heated transverse to the geomagnetic field) and counter-streaming electron fluxes (heated in both directions parallel to the field). This tutorial will begin with a review of the dispersion and propagation characteristics of whistler resonance-cone waves, which comprise the turbulence, and go on to discuss the theories for the excitation of the turbulence. Plasma simulation and mesoscale (Monte Carlo) simulation techniques will be used to illustrate the interaction of the ambient plasma with the turbulence. These calculations will demonstrate how this interaction results in transverse heating of the ions and parallel heating of the electrons of the plasma, leading to the formation of the observed heated and accelerated particle fluxes. Keywords: Lower hybrid waves, VLF waves, Ion conics, Strong turbulence. Reprints. (JHD)

DESCRIPTORS: (U) *AURORAE, BROADBAND, ELECTRONS, ACCELERATION, WHISTLERS, EXCITATION, GEOMAGNETISM, HEAT,

AD-A228 764 CONTINUED

HEATING, HYBRID SYSTEMS, INTENSITY, INTERACTIONS, IONS, MAGNETIC FIELDS, METHODOLOGY, MONTE CARLO METHOD, PARALLEL ORIENTATION, PARTICLE FLUX, PLASMAS(PHYSICS), PROPAGATION, REPRINTS, SIMULATION, TRANSVERSE, TURBULENCE, VERY LOW FREQUENCY, PLASMA WAVES.

IDENTIFIERS: (U) PE61103D, WUAFOSR3484A2, Ion Conics.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A228 765 4/1

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Simulation Studies of Plasma Waves in the Electron Foreshock: The Generation of Langmuir Waves by a Gentle Bump-on-Tail Electron Distribution,

JUN 90 18P

PERSONAL AUTHORS: Dum, C. T.

CONTRACT NO. AFOSR-90-0085

PROJECT NO. 3484

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1109, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Geophysical Research, v95 nA6 p8095-8110, 1 Jun 90.

ABSTRACT: (U) The generation of Langmuir waves by a gentle bump-on-tail electron distribution is analyzed. It is shown that with appropriately designed simulation experiments, quasi-linear theory can be quantitatively verified for parameters corresponding to the electron foreshock. The distribution function developed a plateau by resonant diffusion, and changes outside this velocity range are negligible, except for the contribution of nonresonant diffusion to acceleration of bulk electrons. The dispersions relation is solved for the evolving distribution function and exhibits the dynamics of wave growth and changes in real frequency. The integral of the quasi-liner equations is also used to relate the evolution of distribution function and wave spectrum and gives agreement with the simulations. Even in extremely long simulation runs there is practically no evolution in wave energy or the distribution function once a plateau has been formed. The saturated field levels are much lower than the estimates that are generally used to assess the importance of additional weak or strong turbulence effects. These effects cannot prevent plateau formation and are only noticeable if ions are also included in the model. They then lead to a redistribution of the spectrum toward low wave numbers modes which propagate mainly opposite to the beam. This occurs long after plateau formation and play no significant role in the overall system dynamics or energy balance. One will have to live with quasi-linear theory as a key ingredient for a global model of foreshock wave phenomena. Reprints. (JHD)

DESCRIPTORS: (U) *IONOSPHERIC DISTURBANCES, *PLASMA WAVES, ACCELERATION, BALANCE, DIFFUSION, DISTRIBUTION, DISTRIBUTION FUNCTIONS, DYNAMICS, ELECTRONS, ENERGY, EVOLUTION(GENERAL), GLOBAL, GROWTH(GENERAL), IONS, LANGMUIR PROBES, MODELS, REPRINTS, CYCLOTRON RESONANCE, SATURATION, SIMULATION, SPECTRA, TURBULENCE, VELOCITY.

IDENTIFIERS: (U) Langmuir Plasmas, PE61103D, WUAFOSR3484A2, Electron Foreshock, Langmuir Waves.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A228 762 4/1

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Simulation Studies of Plasma Waves in the Electron Foreshock: The Transition from Reactive to Kinetic Instability,

JUN 90 14P

PERSONAL AUTHORS: Dum, C. T.

CONTRACT NO. AFOSR-90-0085

PROJECT NO. 3484

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1110, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Geophysical Research, v95 nA6 p8111-8122, 1 Jun 90.

ABSTRACT: (U) The electron beam-plasma instability is analyzed in particle simulation experiments, starting with a beam of small velocity spread. The dispersion relation is solved for snapshots of the actual evolving electron distribution function, rather than for the usual models consisting of Maxwellians. As the beam broadens, the analysis shows a transition from reactive beam modes, with frequencies extending much below the plasma frequency omega sub e to kinetic instability of Langmuir waves, omega approx. = omega sub e which is in agreement with the frequencies and growth rates observed in the simulation. Beam evaluation is also in agreement with quasi-linear theory, except at the end of the reactive phase when trapping of beam electrons is seen. Although the spectrum temporarily narrows at this stage, there are, in contrast to previous simulations, still many modes present. The system then can proceed to a kinetic phase in which quasi-linear theory is again applicable. This stage is identical with the evolution starting from a gentle broad beam, except that wave levels are several times higher. With higher wave levels, mode coupling effects are also more prominent, but are still unable to prevent plateau formation. In contrast to the Langmuir wave regime, the reactive broadband wave regime lasts

AD-A228 762 CONTINUED

only for a relatively short period. In the electron foreshock it could only persist if a narrow beam or a sharp cutoff feature were maintained by continued beam injection and the time-of-flight mechanism. Reprints. (JHD)

DESCRIPTORS: (U) *IONOSPHERIC DISTURBANCES, ELECTRON BEAMS, BROADBAND, COUPLING(INTERACTION), DISPERSION RELATIONS, DISTRIBUTION FUNCTIONS, FLIGHT, GROWTH(GENERAL), INJECTION, KINETICS, LANGMUIR PROBES, NARROW BEAMS(RADIATION), PARTICLES, PLASMA WAVES, PLASMAS(PHYSICS), RATES, REACTIVITIES, REPRINTS, SHORT RANGE(TIME), SIMULATION, STABILITY, TEST AND EVALUATION, TIME, VELOCITY.

IDENTIFIERS: (U) Langmuir Plasmas, PE61103D, WUAFOSR3484A2, Langmuir Waves, Electron Foreshock, Time of Flight.

AD-A228 762

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A228 763 20/4

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Numerical Study of a Three-Dimensional Vortex Method.

JAN 90 33P

PERSONAL AUTHORS: Knio, Omar M.; Ghoniem, Ahmed F.

CONTRACT NO. AFOSR-89-0491

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1142, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Computational Physics, v86 n1 p75-106 Jan 90.

ABSTRACT: (U) Numerical simulation is used to study mixing of a passive scalar in a spatially-developing shear layer at high Reynolds number. The numerical method is based on discretization of the vorticity and scalar gradients into finite-area elements and the transport of these elements along particle trajectories. Results show that mixing is governed by the entrainment of fluid from both streams into the large structures generated by the rollup of the vorticity layer. Local value of scalar concentration oscillates, due to the passage of these structures, between values limited by the Peclet number. Instantaneous scalar profiles exhibit mixing asymmetry and the skewness of concentration fraction within the eddies in favor of the high-speed stream. Mixing statistics of a passive scalar agree well with the experimental measurements of Masutani and Bowman in a two-dimensional shear layer, and emphasize the effect of molecular diffusion on mixing. The rate of burning in a single step Arrhenius chemical reactions between the two streams increases due to mixing enhancement, overcoming the decrease due to the strain field generated by rollup. Local product concentration is everywhere proportional to the vorticity, suggesting a new formula for turbulent combustion modeling. (Author) (KR)

DESCRIPTORS: (U) *ENTRAINMENT, *NUMERICAL ANALYSIS,

AD-A228 763

AD-A228 763 CONTINUED

*THREE DIMENSIONAL FLOW, *VORTICES, ASYMMETRY, COMBUSTION, DIFFUSION, EXPERIMENTAL DATA, FLUIDS, FORMULATIONS, GRADIENTS, HIGH RATE, LAYERS, MATHEMATICAL MODELS, MEASUREMENT, METHODOLOGY, MIXING, EDDIES(FLUID MECHANICS), MODELS, MOLECULES, NUMERICAL METHODS AND PROCEDURES, OPTIMIZATION, PARTICLE TRAJECTORIES, PASSIVE SYSTEMS, PROFILES, REYNOLDS NUMBER, SCALAR FUNCTIONS, SHEAR PROPERTIES, STATISTICS, STREAMS, STRUCTURES, DIGITAL SIMULATION, TURBULENCE, TWO DIMENSIONAL.

IDENTIFIERS: (U) Turbulent Combustion, PE61102F, WUAFOSR2308A2.

AD-A228 763

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A228 761 20/2

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Preparation of Pb(x)Ba(1-x)TiO3 and the Effect of the Composition and the Size of the Crystallite on the Crystal Phase,

90 7P

PERSONAL AUTHORS: Saegusa, Kunio; Rhine, Wendell E.; Bowen, H. K.

CONTRACT NO. F49620-89-C-0102

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-1081, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Ceramic Transactions, v8 p221-226 1990.

ABSTRACT: (U) Barium lead titanate powder (99.9% pure) was prepared from barium lead titanyl oxalate, which was previously prepared by reacting high-purity ammonium titanyl oxalate with barium and lead acetate. The critical factors in preparing the barium lead titanyl oxalate were pH, the concentration of the solution and the aging time. The critical crystallite size of BaTiO3 powder from the cubic to the tetragonal phase is around 1 microns Pb0.3Ba0.7Ti)3 powder with an average size of 0.057 microns showed the tetragonal phase. (JS)

DESCRIPTORS: (U) *CRYSTALS, ACETATES, AGING(MATERIALS), AMMONIUM COMPOUNDS, BARIUM, BARIUM TITANATES, LEAD COMPOUNDS, LEAD TITANATES, OXALATES, POWDERS, PURITY, TIME.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

AD-A228 761

AD-A228 760 4/1

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Equatorially Generated ULF Waves as a Source for the Turbulence Associated with Ion Conics,

89 14P

PERSONAL AUTHORS: Johnson, Jay R.; Chang, Tom; Crew, G. B.; Andre, Mats

CONTRACT NO. F49620-86-C-0128

PROJECT NO. 3484

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1062, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physics of Space Plasmas, SPI Conference Proceedings and Reprint Series, n9 p433-445 1989.

ABSTRACT: (U) Low frequency turbulence present on closed field lines in the central plasma sheet has been used to explain ion heating and conic formation with remarkable success. However, the source for the turbulence has yet to be established, and there are no obvious local sources which could power such a broadband spectrum. Alternatively, observations reveal that ion distributions in the equatorial region are often anisotropic, and such distributions excite waves both above and below the proton gyrofrequency. As these wave propagate to lower altitudes where the magnetic field is stronger, their left-hand circularly polarized component resonates with heavy ions. The presence of a parallel gradient in the magnetic field complicates the details of wave propagation, and as a result, downcoming right-hand circularly polarized waves, which acquire a left hand circularly polarized component at the crossover frequency, may tunnel through 'stop zone' to altitudes where they resonant with the ions and thus contribute to the observed ion heating. Reprints. (JHD)

DESCRIPTORS: (U) *IONOSPHERIC DISTURBANCES, *PLASMA WAVES, ALTITUDE, BROADBAND, CIRCULAR, DISTRIBUTION.

AD-A228 760

AD-A228 760 CONTINUED

EQUATORIAL REGIONS, GRADIENTS, HEATING, HEAVY IONS, IONS, LOW ALTITUDE, LOW FREQUENCY, MAGNETIC FIELDS, PARALLEL ORIENTATION, PLASMAS(PHYSICS), POLARIZATION, REPRINTS, SPECTRA, TURBULENCE, ULTRALOW FREQUENCY, WAVE PROPAGATION.

IDENTIFIERS: (U) PE61103D, WUAFOSR3484A2, Ion Heating, Ion Conics, Plasma Sheets, Proton Gyrofrequency.

AD-A228 753 5/8

ILLINOIS UNIV AT URBANA DEPT OF PSYCHOLOGY

(U) The Access and Use of Relevant Information: A Specific Case and General Issues.

90 21P

PERSONAL AUTHORS: Ross, Brian H.

CONTRACT NO. AFOSR-89-0447

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR, XF
TR-90-1099, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: *Pub. in Artificial Intelligence and the Future of Testing*, p173-211 1990.

ABSTRACT: (U) The access and use of relevant information is a crucial aspect of cognition. This chapter examines this issue within a research program of how people are reminded of earlier problems during the learning of a cognitive skill. This discussion focusses on using this research to understand broader issues of memory access. In addition, the empirical findings are used to examine individual differences and provide some speculations on how testing may make use of this general idea. Keywords: Remindings, Analogy, Testing, Reprints.

DESCRIPTORS: (U) *MEMORY(PSYCHOLOGY), *ACCESS, *COGNITION, LEARNING, MEMORY DEVICES, REPRINTS, SKILLS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A4, Remindirgs, Indivdiual differences.

AD-A228 751 6/5

NORTHWESTERN UNIV EVANSTON IL COLL OF ARTS AND SCIENCES

(U) Phosphoprotein Regulation of Behavioral Reactivity.

DESCRIPTIVE NOTE: Final technical rept. 30 Sep 86-1 Oct 89.

JUL 90 16P

PERSONAL AUTHORS: Routtenberg, Aryeh

CONTRACT NO. AFOSR-87-0042

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1104, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The regulation of synaptic reactivity by protein kinase C and its substrates has been studied using the long-term potentation paradigm (LTP). We have studied the effects of protein kinase C activators and inhibitors on the durability of synaptic reactivity. The main conclusion to be drawn is that PKC is necessary but not sufficient for the enhanced durability. In combination with a neural signal, however, PKC demonstrates a profound synergism. Synergism is also observed in the analysis of metal ion regulation of PKC activity. Calcium and zinc interact in their effect on the enzyme in a bidirectional manner. Significant accomplishments made during this period were: determining the effect of inhibitors; the study of PKC activators (PDBu and oleate); metal ion regulation of PKC activity; and a second path for PKC activation. Keywords: Synaptic reactivity, Protein kinase, Activators, Inhibitors, Synergism. (js)

DESCRIPTORS: (U) *NERVOUS SYSTEM, ACTIVATION, BEHAVIOR, CALCIUM, CONTROL, ENZYMES, IONS, METALS, OLEATES, PATHS, REACTIVITIES, SIGNALS, SUBSTRATES, SYNAPSIS, SYNERGISM, ZINC.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A2.

AD-A228 751

AD-A228 750 20/2

CARNEGIE MELLON UNIV PITTSBURGH PA DEPT OF METALLURGICAL ENGINEERING AND MATE RIALS SCIENCE

(U) The Role of Ledges in Phase Transformations.

DESCRIPTIVE NOTE: Final rept. 1 Jun 89-28 Feb 90.

SEP 90 5P

PERSONAL AUTHORS: Aaronson, H. I.

CONTRACT NO. AFOSR-89-0334

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR, XF
TR-90-1105, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Research workers in many countries and in many different research areas have gradually come to realize that ledges play a central role in the growth of crystals from the vapor, liquid and solid phases. However, the structure of ledges is not easy to study experimentally or to analyze theoretically. Similarly, the kinetics of ledgewise growth pose substantial problems to the experimentalist intent on their measurement and to the theoretician studies attempting to account for these data mathematically. Both experimental and theoretical studies during the three major types of phase transformation enumerated have tended to develop more or less independently of each other. The observation of ledges with TEM and field ion microscopy was discussed with emphasizing methods of distinguishing between ledges and dislocations. One speaker make clear the theoretical as well as the experimental problems involved in making this distinction by referring to certain linear defects displayed in his slides as thingies! This issue has greatly worried us in our recent AFOSR-sponsored research, and it was somewhat of a relief to find that this concern is shared by the best of the experts in the field. However, it is now clear that special efforts must be expended upon making this very important distinction--particularly when the ledges are only a few atomic layers high. (JHD)

AD-A228 750

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A228 750 CONTINUED

DESCRIPTORS: (U) *CRYSTAL GROWTH, *DISLOCATIONS, *PHASE TRANSFORMATIONS, DEFECTS(MATERIALS), EXPERIMENTAL DATA, FIELD ION MICROSCOPY, SOLID PHASES, THEORY, VAPORS.

IDENTIFIERS: (U) WUAFOSR2306A1.

AD-A228 749 20/9 20/5

SFA INC LANDOVER MD

(U) Investigation and Modeling of Radiation Absorption Processes and Opacities in Dense Plasmas.

DESCRIPTIVE NOTE: Final rept. 1 Apr 88-28 Feb 90,

SEP 90 101P

PERSONAL AUTHORS: Gupta, Uday

REPORT NO. SFA-0184Z

CONTRACT NO. F49620-88-C-0055

PROJECT NO. 2301

TASK NO. A8

MONITOR: AFOSR TR-90-1073

UNCLASSIFIED REPORT

ABSTRACT: (U) A variety of atomic processes contribute to absorption of radiation in dense plasmas. Most existing atomic data are for low density, high temperature plasmas. At high densities and low temperatures, realistic modeling to incorporate the important additional effects in order to generate atomic data in needed. This is addressed in the present work. The models and computer codes developed for the project includes effects of non-linear screening, electron degeneracy, exchange-correlation and ion interactions self-consistently. These were applied to ions of specific configurations in dense plasmas and represent improvements over 'average atom models' often used in dense plasma physics. The focus of this work is mainly on the bound-bound, bound-free and free-free photoprocesses, the contribute to radiation absorption and opacity of dense, low temperature plasmas. We discuss a model to generate ionic distribution that is computationally faster than rate equation method. We also discuss a model to investigate the d.c. electron conduction in dense plasmas, which incorporates effects of multiple scattering and improves over the Ziman type model. These self-consistent models and computer codes are very useful tools to generate large data bases for atomic processes

AD-A228 749 CONTINUED

contributing to radiation absorption and opacities in dense plasmas. Those data would be a useful input to simulation of radiative properties of dense plasmas in various laboratory and astrophysical conditions. (jhd)

DESCRIPTORS: (U) *DENSE GASES, *PLASMAS(PHYSICS), RADIATION ABSORPTION, ASTROPHYSICS, ATOMIC PROPERTIES, ATOMS, COMPUTER PROGRAMS, CONDUCTIVITY, CONFIGURATIONS, CONSISTENCY, DATA BASES, ELECTRONS, EQUATIONS, EXPERIMENTAL DATA, HIGH DENSITY, HIGH TEMPERATURE, IONS, LOW DENSITY, LOW TEMPERATURE, MODELS, NONLINEAR SYSTEMS, RADIATION, RADIATION ABSORPTION, RATES, SCATTERING, SIMULATION.

IDENTIFIERS: (U) Dense Plasmas, WUAFOSR2301A8, PE61102F.

AD-A228 749

AD-A228 747 20/4

PRINCETON UNIV NJ DEPT OF MECHANICAL AND AEROSPACE ENGINEERING

(U) Numerical Studies of the Structure of Turbulent Shear Flow.

DESCRIPTIVE NOTE: Final rept. Jan 87-Jan 90,

JUL 90 11P

PERSONAL AUTHORS: Orszag, Steven A.

CONTRACT NO. F49620-87-C-0036

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1071, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Renormalization group methods (RNG) have been applied to large eddy simulations of wall regions of channel flows and spectral element RNG simulations of flows in complex geometries were explored. The results predicted wall region streaks accurately at much less spatial resolution than earlier methods. The methods were extended to compressible flows. They have been used to show that the shock region is characterized by large negative values of the divergence indicating tube-like structures. High enstrophy regions reside outside the shock regions. High vorticity regions in incompressible flow tend to be concentrated in tubes, while in compressible flows they tend to be concentrated in sheets. RNG was also applied to k-e modelling of the flow over a backstep. Full simulations were also completed for large Reynolds number turbulence. Keywords: Turbulence, Simulation renormalization group. (JHD)

DESCRIPTORS: (U) *EDDIES(FLUID MECHANICS), *SHEAR PROPERTIES, *TURBULENT FLOW, CHANNEL FLOW, COMPRESSIBLE FLOW, INCOMPRESSIBLE FLOW, NUMERICAL ANALYSIS, REGIONS, RESOLUTION, REYNOLDS NUMBER, SHOCK, SIMULATION, SPATIAL DISTRIBUTION, TURBULENCE, VORTICES, WALLS.

IDENTIFIERS: (U) Renormalization Groups, PE61102F.

AD-A228 747

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A228 747 CONTINUED

WUAFOSR2307A2.

AD-A228 746 7/6

RENSSELAER POLYTECHNIC INST TROY NY

(U) New Non-Linear Optical Polymers.

DESCRIPTIVE NOTE: Final rept. 15 May 88-14 Oct 89,

AUG 90 144P

PERSONAL AUTHORS: Gorodisher, Ilya

CONTRACT NO. F49620-88-C-0078

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-1070, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Doctoral thesis.

ABSTRACT: (U) New polyurethanes were prepared which exhibit non-linear optical activity. The polymers were poled during synthesis, advantage being taken of the fast polymerization kinetics. Second harmonic generation (SHG) was observed from these polymers. In selected cases, no decrease in the SHF signal (due to depolarization) was observed at room temperature for up to one month. The SHG activity of a series of organic model compounds was also investigated. Keywords: Optical polymers; Polyurethanes; Harmonic generation. (JS)

DESCRIPTORS: (U) *POLYMERIZATION, DEPOLARIZATION, HARMONIC GENERATORS, KINETICS, NONLINEAR SYSTEMS, OPTICAL MATERIALS, OPTICAL PROPERTIES, ORGANIC COMPOUNDS, POLYMERS, POLYURETHANE RESINS, ROOM TEMPERATURE, SIGNALS, SUPERHIGH FREQUENCY, SYNTHESIS.

IDENTIFIERS: (U) WUAFOSR2303A3, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A228 542 12/6

SOUTHERN METHODIST UNIV DALLAS TX DEPT OF COMPUTER SCIENCE AND ENGINEERING

(U) Optimization Algorithms for New Computer Architectures with Application to Routing and Scheduling (Year 3).

DESCRIPTIVE NOTE: Final rept. 1 May 89-30 Sep 90,

OCT 90 14P

PERSONAL AUTHORS: Kennington, Jeffrey L.; Helgason, Richard V.

REPORT NO. SMU-5-25104D

CONTRACT NO. AFOSR-87-0199

PROJECT NO. 2304

TASK NO. A8

MONITOR: AFOSR, XF
TR-90-1088, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) One of the most important computer architecture innovations to appear in the market place during the last ten years is parallel processing on a shared memory multicomputer. This report presents new algorithms for a variety of network models along with empirical analysis on both sequential and parallel computers. An empirical study on the AT and T KORBX system is also presented. This system uses eight processors each of which has vector capability. Our research program objective is to develop and empirically test new parallel algorithms and software for a wide variety of optimization problems. The problems studied this past year include the shortest path problem, the assignment problem, the semi-assignment problem, the transportation problem, and the generalized network problem. Algorithms for all of these models have been developed and empirically tested on a variety of computers. In addition, we worked with the Military Airlift Command to test the AT&T KORBX system located at Scott Air Force Base. (kr)

DESCRIPTORS: (U) *ALGORITHMS, *COMPUTER ARCHITECTURE,

AD-A228 542

AD-A228 542 CONTINUED

*OPTIMIZATION, AIR FORCE FACILITIES, COMPUTER PROGRAMS, COMPUTERS, EXPERIMENTAL DATA, MEMORY DEVICES, MODELS, NETWORKS, PARALLEL PROCESSING, PATHS, ROUTING, SEQUENCES, TEST AND EVALUATION, TIME SHARING, TRANSPORTATION, VECTOR ANALYSIS, MULTIPROCESSORS, SCHEDULING, COMPUTER NETWORKS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A8.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A228 541 5/8

JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF PSYCHOLOGY

(U) Pre-Attentive and Attentive Visual Information Processing.

DESCRIPTIVE NOTE: Final technical rept. 1 Apr 87-30 Jun 90,

SEP 90 12P

PERSONAL AUTHORS: Egeth, Howard E.

CONTRACT NO. AFOSR-87-0180

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR, XF
TR-90-1118, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Research carried out on several interrelated topics is described. These projects are all in the area of visual cognition, and focus on feature and object perception, models of selective attention, and the nature of visual routines such as curve tracing and subitizing. The major thrust of this endeavor has been to explore the nature of visual processes to determine the extent to which they are carried out in parallel or in series. Keywords: Reports/abstracts; Attention /visual perception; Information processing; Vision/cognition; Visual search; Curve tracing. (edc)

DESCRIPTORS: (U) *ATTENTION, *INFORMATION PROCESSING, *VISUAL PERCEPTION, ABSTRACTS, COGNITION, CURVE FITTING, MODELS, REPORTS, SEARCHING, VISION, PATTERN RECOGNITION.

IDENTIFIERS: (U) Feature perception, Subitizing, PE61102F, WUHFOSR2313A4.

AD-A228 541

AD-A228 540 6/5

ILLINOIS UNIV AT URBANA COLL OF VETERINARY MEDICINE

(U) A Comparative Study Regarding the Association of Alpha-2U Globulin with the Nephrotoxic Mechanism of Certain Petroleum-Baswd Air Force Fuels.

DESCRIPTIVE NOTE: Final rept. 1 Dec 87-30 Jun 90,

SEP 90 15P

PERSONAL AUTHORS: Eurell, Thomas E.

CONTRACT NO. AFOSR-88-0033

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR, XF
TR-90-1117, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Fisher 344 males rats have a dose and time-dependent renal proximal tubular degeneration induced by certain hydrocarbon compounds. We have used rat strain variation of the alpha-2U globulin molecule and metabolic alteration of the urinary pH as methods to investigate the hydrocarbon-induced nephrotoxic response. Three significant advances have been made during this project: (1) the development of a histochemical procedure to specifically evaluate decalin-induced changes in the lysosomes of rat renal tubular epithelial cells, (2) the discovery that pigmented male rats demonstrate hydrocarbon-induced nephrotoxicity, and (3) the discovery of a difference in the hydrocarbon-induced nephrotoxicity response of male rats following alteration of the urinary pH. Sodium bicarbonate-induced elevation of the urinary pH markedly altered the lysosomal integrity and morphologic appearance of renal tubular cells in male rats exposed to decalin. (JS)

DESCRIPTORS: (U) *HISTOCHEMISTRY, BIODETERIORATION, CELL STRUCTURE, CELLS, HYDROCARBONS, KIDNEYS, MALES, PH FACTOR, PIGMENTS, RATS, STRAINS(BIOLOGY), TUBULAR STRUCTURES, URINE, VARIATIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A5.

AD-A228 540

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A227 835 20/4

STANFORD UNIV CA DEPT OF MECHANICAL ENGINEERING

(U) Numerical Study of a Three-Dimensional Turbulent Boundary Layer.

DESCRIPTIVE NOTE: Final rept. 1 Jul 87-30 Jun 90,

AUG 90 12P

PERSONAL AUTHORS: Moin, Parviz

CONTRACT NO. AFOSR-87-0285

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1027, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Original contains color plates: All DTIC and NTIS reproductions will be in black and white.

ABSTRACT: (U) The effects of transverse strain on an initially two-dimensional turbulent boundary layer are studied in a direct numerical simulation of a planar channel flow with impulsively started transverse pressure gradient. Consistent with experiments in three-dimensional boundary layers, the simulation shows a decrease in the Reynolds shear stress with increasing transverse strain. Also, the directions of the Reynolds shear stress vector and the mean velocity gradient vector were found to differ. In addition, the simulation shows a drop in the turbulent kinetic energy. Terms in the Reynolds stress transport equations were computed. The balances indicate that the decrease in turbulent kinetic energy is a result of a decrease in turbulence production, along with an increase in turbulent dissipation. The effects of the transverse pressure gradient on the instantaneous flow structures were investigated. (jd)

DESCRIPTORS: (U) *NUMERICAL ANALYSIS, *THREE DIMENSIONAL FLOW, *TURBULENT BOUNDARY LAYER, CHANNEL FLOW, DISSIPATION, EQUATIONS, GRADIENTS, KINETIC ENERGY, MATHEMATICAL MODELS, MEAN, MOMENTUM TRANSFER, PLANAR STRUCTURES, PRESSURE GRADIENTS, PRODUCTION, SHEAR

AD-A227 835 CONTINUED

STRESSES, SIMULATION, TRANSPORT PROPERTIES, TRANSVERSE, TURBULENCE, VELOCITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2307A2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A227 552 7/2

NORTH TEXAS STATE UNIV DENTON DEPT OF CHEMISTRY

(U) Intramolecular Alkene-Oxirane Cycloadditions. Synthesis and Structure of 5-Oxapentacyclo(7.3.0.0(3,7).0(4,12)0.(8,10)Dodecane-2,8-Dione,

90 11P

PERSONAL AUTHORS: Marchand, Alan P.; Reddy, G. M.; Watson, William H.; Kashyap, Ram

CONTRACT NO. AFOSR-88-0132

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-0889, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Tetrahedron, v46 n10 p3409-3418 1990.

ABSTRACT: (U) MCPBA promoted epoxidation of the C(9)-C(10) double bond in endo-tri cyclo-(6.2.1.o(2,7))undeca-4, 9-diene-3, 6-dione (4) followed by intramolecular (2 + 2) photocyclization of the resulting exo epoxide (5) afforded the title compound, 1, in 16% overall yield. The structure of symmetrically hydrated 1 (i.e., 1a) was determined by single crystal x-ray crystallographic methods. Proton and carbon-13 NMR spectral assignments are given for epoxide 5. Keywords: Intramolecular Alkene oxirane Cycloaddition, Photocycloaddition, X-ray crystal structure, Reprints. (js)

DESCRIPTORS: (U) *CRYSTAL STRUCTURE, EPOXIDATION, EPOXY COMPOUNDS, REPRINTS, SPECTRA, SYNTHESIS, X RAYS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

AD-A227 551 6/3

NORTH TEXAS STATE UNIV DENTON DEPT OF CHEMISTRY

(U) Enantioselective Microbial Asymmetric Reduction of Pentacyclo (5.4.0.0(2,6).0(3,10).0(5,9) Undecane-8,11-Dione,

90 5P

PERSONAL AUTHORS: Marchand, Alan P.; Reddy, G. M.

CONTRACT NO. AFOSR-88-0132

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-0891, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Tetrahedron Letters, v31 n13 p1811-1814 1990.

ABSTRACT: (U) Baker's yeast promotes moderately enantioslective but diasterorandom reduction of pentacyclo(5.4.0.0(2,6).0(3,10).0(5,9))undecane-8,11-dione via preferential hydrogen transfer to the exo-Si and endo-Re faces of one of the two C=O groups. Keywords: Pentacyclo(5.4.0.0.(2,6).0(3,10).0(5,9))undecane-8,11-dione; Microbial reduction; Asymmetric reduction; Baker's yeast; Reprints. (js)

DESCRIPTORS: (U) *MICROORGANISMS, ASYMMETRY, HYDROGEN, REDUCTION, REPRINTS, TRANSFER.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A227 409 12/1 12/6

GEORGE WASHINGTON UNIV HAMPTON VA JOINT INST FOR ADVANCEMENT OF FLIGHT SCIENC ES

(U) Nonlinear Finite Element Dynamics on Multiprocessor Computers.

DESCRIPTIVE NOTE: Final rept. 1 Apr 88-30 Jun 90,

JUL 90 40P

PERSONAL AUTHORS: Noor, Ahmed K.

CONTRACT NO. AFOSR-88-0136

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-1033, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A computational procedure is presented for the nonlinear dynamic analysis of unsymmetric structures on vector multiprocessor systems. The procedure is based on novel hierarchical partitioning strategy in which the response of the unsymmetric structure at any time instant is approximated by a linear combination of symmetric and antisymmetric response vectors, each obtained by using only a fraction of the degrees of freedom of the original finite element model. The three key elements of the procedure which result in a high degree of concurrency throughout the solution process are (1) mixed (or primitive variable) formulation with independent shape functions for the different fields; (2) operator splitting or restructuring of the discrete equations at each time step to delineate the symmetric and antisymmetric vectors constituting the response; and (3) two-level iterative process for generating the response of the structure. An assessment is made of the effectiveness of the procedure on the CRAY X-MP/4 computers. Keywords: Parallel processing, Symmetry transformations, Operator splitting, Mixed formulations, Iterative. (KR)

DESCRIPTORS: (U) *FINITE ELEMENT ANALYSIS, *MULTIPROCESSORS, *SYSTEMS ANALYSIS, COMPUTATIONS,

AD-A227 409

AD-A227 409 CONTINUED

DISCRETE DISTRIBUTION, DYNAMICS, EQUATIONS, FORMULATIONS, FUNCTIONS, ITERATIONS, MATHEMATICAL MODELS, MIXING, NONLINEAR ANALYSIS, NONLINEAR SYSTEMS, OPERATORS(PERSONNEL), PARALLEL PROCESSING, RESPONSE, SHAPE, SOLUTIONS(GENERAL), SPLITTING, SYMMETRY, TRANSFORMATIONS, VECTOR ANALYSIS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A227 372 9/3 9/1 20/12

TEXAS UNIV AT AUSTIN DEPT OF PHYSICS

(U) Picosecond Laser System for High Speed Characterization of Monolithic Devices.

DESCRIPTIVE NOTE: Final rept. 1 Dec 88-31 Dec 89,

DEC 89 4P

PERSONAL AUTHORS: Downer,

CONTRACT NO. AFOSR-89-0209

PROJECT NO. 2305, 3842

TASK NO. A3

MONITOR: AFOSR TR-90-1046

UNCLASSIFIED REPORT

ABSTRACT: (U) Accurate characterization of high-speed electronic circuitry requires the introduction of optical sampling as a method of generating and measuring large electrical bandwidths. The optical sampling techniques that can be employed for measuring the electrical response of a circuit consist of electro-optic sampling 1, 2 and photoconductive switching 3,4. In electro-optic sampling, the fields of a propagating electrical pulse induce a transient birefringence in an electro-optic crystal which, in turn, rotates the polarization of an optical probe pulse transmitted through the crystal. The time resolution of the polarization rotation is an indirect measurement of the time evolution of hte propagating pulse as it passes the crystal. In addition, the crystal can be dipped into the fringing fields of the propagating electrical pulse above the circuit substrate, allowing for high spatial resolution while remaining noncontacting. In photoconductive switching, a small gap between two biased, transmission line conductors laid down on a semiconducting substrate can be electrically closed by an optical pulse focused onto the gap. This results in the generation of an electrical pulse whose shape and duration are determined by the laser pulsewidth, the circuit characteristics of the gap and transmission line and the photo-excited carrier lifetime of the substrate. (rh)

AD-A227 372

AD-A227 372 CONTINUED

DESCRIPTORS: (U) *LASERS, *LIGHT PULSES, *MONOLITHIC STRUCTURES(ELECTRONICS), *SEMICONDUCTORS, *TRANSMISSION LINES, BIREFRINGENCE, CIRCUITS, CRYSTALS, ELECTRIC CONDUCTORS, ELECTRIC CURRENT, ELECTRICAL PROPERTIES, ELECTRONICS, ELECTROOPTICS, EVOLUTION(GENERAL), HIGH RESOLUTION, MEASUREMENT, METHODOLOGY, OPTICAL EQUIPMENT, OPTICAL PROPERTIES, OPTICS, POLARIZATION, PROBES, PROPAGATION, PULSES, RESOLUTION, RESPONSE, ROTATION, SAMPLING, SPATIAL DISTRIBUTION, SUBSTRATES, TIME, TRANSIENTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305C1, WUAFOSR3842A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A227 371 11/2 7/4

TECHNION RESEARCH AND DEVELOPMENT FOUNDATION LTD HAIFA (ISRAEL)

(U) Electrophoretic and Electrolytic Deposition of Ceramic Particles on Porous Substrates.

DESCRIPTIVE NOTE: Annual rept. 1 Jul 89-30 Jun 90,

AUG 90 94P

PERSONAL AUTHORS: Gal-Or, L.; Haber, S.; Liubovich, S.

CONTRACT NO. AFOSR-89-0474

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1047, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Electrophoretic deposition of ceramic particles on porous graphite and their penetration into the pores was demonstrated and studied both theoretically and experimentally/ The theoretical analysis enables to predict the penetration depth of the particles as function of two non-dimensional parameters based on solvent properties, field strength and particle size and concentration. In the experimental studies the amount of induced material was found to increase with the ratio of dielectric constant to viscosity of the solvent, as well as with particle concentration and field intensity. However, due to simultaneous buildup of an overlying deposit penetration as function of deposition time reaches a plateau. In parallel studies on electrolytic deposition, ZrO2 coatings were deposited on porous graphite from an aqueous solution of ZrO(NO3)2. The deposition kinetics and microstructure of the deposit were studied. The initial amorphous deposits transformed into crystalline ZrO2 polymorphs with nanocrystalline dimensions following heat treatment. (RRH)

DESCRIPTORS: (U) *CERAMIC MATERIALS, *ELECTROPHORESIS, *PARTICLE SIZE, *POROUS MATERIALS, AMORPHOUS MATERIALS, CONSTANTS, DEPOSITION, DEPOSITS, DEPTH, DIELECTRIC PROPERTIES, ELECTROLYSIS, EXPERIMENTAL DATA, FIELD

AD-A227 371 CONTINUED

INTENSITY, GRAPHITE, KINETICS, MATERIALS, MICROSTRUCTURE, PARALLEL ORIENTATION, PARAMETERS, PARTICLES, PENETRATION, RATIOS, SOLVENTS, SUBSTRATES, THEORY, TIME, VISCOSITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A227 368 5/2

AIR FORCE OFFICE OF SCIENTIFIC RESEARCH BOLLING AFB DC

(U) Air Force Office of Scientific Research Technical Report Summaries: January-March 1990.

DESCRIPTIVE NOTE: Quarterly rept.,

MAR 90 355P

PERSONAL AUTHORS: Tyrrell, Debra L.

MONITOR: AFOSR, XF
TR-90-0929, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The Air Force Office of Scientific Research Technical Report Summaries is published quarterly (March, June, September, and December). It contains a brief summary of each technical report received in the Technical Information Division and submitted to the defense Technical Information Center (DTIC) for that quarter. Two indexes, subject and personal author are provided to help the user locate reports that may be of interest. The purpose of this report is to inform Air Force Laboratories about the science that the Air Force Office of Scientific Research is supporting.

DESCRIPTORS: (U) *AIR FORCE RESEARCH, ANNOUNCEMENT BULLETINS, REPORTS, ABSTRACTS, AIR FORCE EQUIPMENT, AIR FORCE OPERATIONS.

AD-A227 367 5/2

AIR FORCE OFFICE OF SCIENTIFIC RESEARCH BOLLING AFB DC

(U) Air Force Office of Scientific Research Technical Report Summaries: April-June 1990.

DESCRIPTIVE NOTE: Quarterly rept.

JUN 90 201P

MONITOR: AFOSR, XF
TR-90-0928, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The Air Force Office of Scientific Research Technical Report Summaries is published quarterly (March, June, September, and December). It contains a brief summary of each technical report received in the Technical Information Division and submitted to the Defense Technical Information Center for the quarter. Three indexes, subject, personal author and title are provided to help the user locate reports that may be of interest. The purpose of this report is to inform Air Force Laboratories about the science that the Air Force Office of Scientific Research is supporting.

DESCRIPTORS: (U) *AIR FORCE RESEARCH, ANNOUNCEMENT BULLETINS, REPORTS, ABSTRACTS, AIR FORCE EQUIPMENT, AIR FORCE OPERATIONS.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A227 366 12/9

WASHINGTON UNIV ST LOUIS MO DEPT OF SYSTEMS SCIENCE AND MATHEMATICS

(U) Artificial Intelligence Methods in Pursuit Evasion Differential Games.

DESCRIPTIVE NOTE: Final rept. 1 Jun 87-31 May 90,

JUL 90 219P

PERSONAL AUTHORS: Rodin, Ervin Y.

CONTRACT NO. AFOSR-87-0252

PROJECT NO. 2304

TASK NO. A9

MONITOR: AFOSR, XF
TR-90-0947, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The principal portion of this Final Report on the present grant, Artificial Intelligence Methods in Pursuit Evasion Differential Games consists of an attached Technical Report by Rodin and Weil, on Differential Games and Artificial Intelligence in Air Combat. The rest of the report is a brief summary of our activities and achievements under the grant during the past three years. The summary is brief, because it is merely a restatement of reports sent by the P.I. to the AFOSR regularly during the life of the grant. The air of the research here proposed is to develop the conceptual framework and the software for the prototype of an operational, on-board, real time multiprocessing computer system, capable of assisting the pilot in flight and fire control decisions; in other words, a Tactical Decision Aiding Expert System (TDAES). The end product of this research will be for use in theoretical combat planning and analysis; in practical fighter pilot training (e.g., in simulations); and as an actual aid for pilots in support of their tactical decision making diurnal flights. The nature of this research is intelligent control of a very specific type; we intend to combine certain aspects of differential game theory, 3 dimensional computational geometry and artificial intelligence in a unique way, so as to provide a solution to the problem described above.

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(kr)

DESCRIPTORS: (U) *ARTIFICIAL INTELLIGENCE *GAME THEORY, *DECISION AIDS, AERIAL WARFARE, AIR, WARFARE, COMPUTER PROGRAMS, JET FIGHTERS, PILOTS, TRAINING, CONTROL, DECISION MAKING, FIRE CONTROL SYSTEMS, INFLIGHT, EVASION.

IDENTIFIERS: (U) TDAES(Tactical Decision Aiding Expert System).

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A227 365 1/1

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF AEROSPACE ENGINEERING

(U) Control of Unsteady Aerodynamic Forces.

DESCRIPTIVE NOTE: Final rept. 1 May 88-30 Apr 90,

JUL 90 67P

PERSONAL AUTHORS: Ho, Chih-Ming

CONTRACT NO. F49620-88-C-0061

PROJECT NO. 2307

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-0924, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The aerodynamic properties of an airfoil under unsteady conditions are very different from ones in steady conditions because the vortex generated by unsteady separation greatly modifies the loading on the wing. In this study, a fundamental approach was taken to investigate the lift and the velocity field of unsteady airfoils. Keywords: Airfoil unsteady water channels, Delta wings, Lift, Flow visualization. (Author) (KR)

DESCRIPTORS: (U) *AERODYNAMIC CHARACTERISTICS, *AIRFOILS, *UNSTEADY FLOW, AERODYNAMIC FORCES, DELTA WINGS, FLOW VISUALIZATION, STEADY STATE, VELOCITY, WINGS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2307A3.

AD-A227 364 20/4

CALIFORNIA UNIV SAN DIEGO LA JOLLA

(U) Investigations of Equilibria, Lattices, and Chatoic Dynamics of 2-D Hamiltonian Point Vortices.

DESCRIPTIVE NOTE: Final rept. 1 Nov 88-31 Oct 89,

AUG 90 108P

PERSONAL AUTHORS: Kadtke, James

CONTRACT NO. AFOSR-87-0072

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR, XF
TR-90-0944, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The aim of the proposed research effort involved theoretical work, both analytic and numerical, on a number of different problems which were all loosely tied together as involving some aspect of vortex systems, and their relation to chaos in fluid flows. Significant results were obtained during this funding period in several major topics. The first topic which was investigated was a continuation of the author's previous work on vortex lattices. Results consisted of the refinement of the analytic expression for the lattice summation of an infinite lattice of point vortices, and use of this expression to calculate the allowed lattice structures of two-component triangular lattice. It was also shown how these expressions can be used to calculate the bulk physical properties of vortex lattices, by calculating the energy of slip displacement for the triangular lattice. (jhd)

DESCRIPTORS: (U) *VORTICES, LATTICE DYNAMICS, FLUID FLOW, THEORY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304K7, Chaos.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A227 307 11/4

UTAH UNIV SALT LAKE CITY DEPT OF MECHANICAL ENGINEERING

(U) Failure in Laminated Composite Plates Containing a Hole.

DESCRIPTIVE NOTE: Final rept. 1987-1990,

JUL 90 72P

PERSONAL AUTHORS: Folias, E. S.

CONTRACT NO. AFOSR-87-0204

PROJECT NO. 2302

TASK NO. B2

MONITOR: AFOSR
TR-90-0937

UNCLASSIFIED REPORT

ABSTRACT: (U) Investigation concerns the 3D stresses in a laminated composite plate weakened by a circular hole. The analysis is based on 3D macromechanical considerations. The debonding aspects are investigated between a fiber/matrix interface particularly in the region where the fiber intersects a free edge, e.g., the surface of a hole. The results, which are based on micromechanical considerations, are then used to predict the critical applied load stress which may cause initiation of ply-delamination. Keywords: Composite plates; Laminates. (RH)

DESCRIPTORS: (U) *COMPOSITE STRUCTURES, *LAMINATES, *PLATES, EDGES, STRESSES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2302B2.

AD-A227 306 12/1 12/3 11/4

BROWN UNIV PROVIDENCE RI DIV OF APPLIED MATHEMATICS

(U) Control of Distributed Parameter Systems.

DESCRIPTIVE NOTE: Final rept. 15 Sep 86-20 Sep 89,

AUG 90 51P

PERSONAL AUTHORS: Banks, H. T.

CONTRACT NO. F49620-86-C-0111

PROJECT NO. 3484

TASK NO. A5

MONITOR: AFOSR
TR-90-0927

UNCLASSIFIED REPORT

ABSTRACT: (U) A unified approximation framework for parameter estimation in general linear partial differential equators models has been completed. This framework has provided the theoretical basis for a number of identification problems on which these investigators have made significant progress. These include: i) nondestructive evaluation techniques of composite materials using thermal probes. (ii) estimation of damping in composite material beams from vibration experiments. In connection with item (ii) it has been shown conclusively that an identification of damping mechanisms in the partial differential equation of a composite beam cannot be accomplished by the use of experimental model analysis. This is a major result in the theory of identifying damping mechanisms in flexible structures. The group has also studied questions related to the determination of irregularities (corrosion, cracks, delaminations, etc.) in composite materials using boundary observations of temperatures after known heat fluxes have been applied to the boundary. Successful efforts using experimental data with the theoretical and computational ideas developed by this group are reported. Substantial progress has been made on the development of a statistical framework (including hypothesis testing algorithms) to use in comparing the suitability of PDE models in least squares fits to data. A number of results on feedback stabilization of distributed parameter model

AD-A227 306 CONTINUED

have been obtained. (KR)

DESCRIPTORS: (U) *COMPOSITE MATERIALS, *NONDESTRUCTIVE TESTING, *PARTIAL DIFFERENTIAL EQUATIONS, *LINEAR DIFFERENTIAL EQUATIONS, ALGORITHMS, BEAMS(STRUCTURAL), BOUNDARIES, COMPOSITE STRUCTURES, CORROSION, CRACKS, DAMPING, DISTRIBUTION, ESTIMATES, EXPERIMENTAL DATA, FEEDBACK, FLEXIBLE STRUCTURES, HEAT FLUX, HYPOTHESES, IDENTIFICATION, LAMINATES, LEAST SQUARES METHOD, MODELS, PARAMETERS, PROBES, PROBLEM SOLVING, STABILIZATION, TEMPERATURE, TEST AND EVALUATION, THERMAL PROPERTIES, VIBRATION.

IDENTIFIERS: (U) PE61103D, WUAFOSR3484A5.

AD-A227 305 20/9 20/7 21/3

R AND D ASSOCIATES ALEXANDRIA VA

(U) MPD Thrust Chamber Flow Dynamics.

DESCRIPTIVE NOTE: Final rept. Oct 88-30 Oct 89.

AUG 90 46P

CONTRACT NO. F49620-86-C-0117

PROJECT NO. 2308

TASK NO. AT

MONITOR: AFOSR, XF
TR-90-0926, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Flow within the thrust chamber of an MPD arcjet is examined experimentally and modeled with a two-dimensional MHD code. Two quasi-steady MPD thrusters are considered under the same input conditions of current (21 kA) and total mass flow rate (0.006 kg/s, argon + 1.5% hydrogen). The arcjets have the same basic design, consisting of a central cathode, 3.8 cm diameter and 5 cm long, separated from a coaxial anode of equal length by a uniform gap of 2.3 cm. Two different mass injection arrangements are used (100% at mid-radius, and 50% at the cathode base, with the remainder at mid-radius). A new spectroscopic analysis procedure is developed that allows distributions of radial speed, heavy-particle temperature and turbulent speed to be extracted from chordal measurements of light emission by the two species in the plasma flow. Good qualitative (and reasonable quantitative) agreement exists with distributions calculated by the MHD code, indicating that flow within the thrust chamber expands from an electromagnetically-pumped plasma base (vs a pumped jet off the cathode tip). The significant variation of internal flow dynamics with mass injector arrangement implies the need for extensive experimentally-validated code modeling in order to evaluate the potential performance of MPD thrusters. (RRH)

DESCRIPTORS: (U) *MAGNETOHYDRODYNAMICS, *MASS FLOW, *PLASMAS(PHYSICS), *THRUSTERS, ANODES, CATHODES, COAXIAL CONFIGURATIONS, CODING, DISTRIBUTION, DYNAMICS, EMISSION, FLOW, FLOW RATE, INJECTION, INJECTORS, INPUT, INTERNAL,

AD-A227 305 CONTINUED

LENGTH, LIGHT, MASS, SPECTROSCOPY, THRUST CHAMBERS, TURBULENCE, TWO DIMENSIONAL, VELOCITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A1.

AD-A227 304 12/4 22/2 22/5

INTEGRATED SYSTEMS INC SANTA CLARA CA

(U) Adaptive Control of Large Space Structures.

DESCRIPTIVE NOTE: Final rept. 1 Feb 89-31 Mar 90,

AUG 90 39P

PERSONAL AUTHORS: Kosut, Robert L.

REPORT NO. ISI-5877-01

CONTRACT NO. F49620-89-C-0043

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR TR-90-0921

UNCLASSIFIED REPORT

ABSTRACT: (U) Preliminary results are presented for set estimation of uncertain nonlinear systems. Set estimation is a process in an adaptive robust control system which produces a set of models from the measured data. The set is then used in an on-line robust control design to implement a controller which is guaranteed to achieve performance goals for all members on the set. The scheme works whenever the actual system which produced the data is a member of the estimated set. The results of this report extend some previous work in linear set estimation to nonlinear systems. This report also summarizes an analysis of an adaptive nonlinear system using the method of averaging. The aim of adaptive control is to implement in real-time and on-line as many as possible of the design functions now performed off-line by the control engineer. Although it is easy to configure an adaptive system by connecting an estimator and control design rule, research is essential to identify the performance limitations of adaptive strategies for LSS control. The long range goal of this research program is to establish guidelines for selecting the appropriate strategy, to evaluate performance improvements over fixed-gain mechanizations, and to examine the architecture necessary to produce a practical hardware realization. The initial and continuing thrust, however, is to build a strong

AD-A227 304 CONTINUED

theoretical foundation without losing sight of the practical implementation issues. (KR)

DESCRIPTORS: (U) *ADAPTIVE CONTROL SYSTEMS, *SPACECRAFT, *AERONAUTICAL ENGINEERING, ADAPTIVE SYSTEMS, CONTROL, CONTROL SYSTEMS, ENGINEERS, ESTIMATES, LIMITATIONS, LINEARITY, LONG RANGE(DISTANCE), LONG RANGE(TIME), MODELS, NONLINEAR SYSTEMS, SET THEORY, STRATEGY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2302B1.

AD-A227 286 12/7

SOUTHERN METHODIST UNIV DALLAS TX DEPT OF COMPUTER SCIENCE AND ENGINEERING

(U) Efficient Algorithms for the Solution of Problems on Networks in the Parallel Computing Environment.

DESCRIPTIVE NOTE: Final rept. 1 May 89-31 Aug 90,

AUG 90 15P

PERSONAL AUTHORS: Kennington, Jeffery L.; Helgason, Richard V.

CONTRACT NO. F49620-89-C-0109

PROJECT NO. CINC

TASK NO. A1

MONITOR: AFOSR, XF
TR-90-1032, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) One of the most important computer architecture innovations to appear in the market place during the last ten years is parallel processing on a shared memory multicomputer. This report presents new algorithms for a variety of network models along with empirical analysis on both sequential and parallel computers. An empirical study on the AT and T KORBX system is also presented. This system uses eight processors each of which has vector capability. Keywords: Military airlift applications, One to one shortest path problem, Parallel algorithms. (Author) (kr)

DESCRIPTORS: (U) *COMPUTER NETWORKS, *MULTIPROCESSORS, AIRLIFT OPERATIONS, ALGORITHMS, COMPUTER ARCHITECTURE, COMPUTERS, EFFICIENCY, ENVIRONMENTS, EXPERIMENTAL DATA, MEMORY DEVICES, MILITARY AIRCRAFT, MILITARY APPLICATIONS, MODELS, PARALLEL PROCESSING, PATHS, SEQUENCES, TIME SHARING, VECTOR ANALYSIS.

IDENTIFIERS: (U) WUAFOSRCINCA1, PE65104D.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A227 276 22/1

MARTIN MARIETTA ASTRONAUTICS GROUP DENVER CO

(U) Large Space Manipulators Study.

DESCRIPTIVE NOTE: Final rept. May 88-May 90,

JUN 90 59P

PERSONAL AUTHORS: Schmitz, Eric; Ramey, Madison

REPORT NO. MCR-90-513

CONTRACT NO. F49620-88-C-0037

PROJECT NO. D812

TASK NO. K1

MONITOR: AFOSR, XF
TR-90-1031, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report documents the research performed for the Large Space Manipulator Study contract. The derivation of nonlinear dynamic models for a simple 3-D articulated, elastic structure is discussed. Kane's dynamics equations are used to obtain equations of motion is closed form; the bending deformations of the elastic links, modelled as slender elastic beams, are described with the assumed-modes method. A 2-D planar version of the dynamic model is used to predict the dynamic behavior of an experimental, articulated two-link elastic structure. Both links consist of thin elastic beams with rectangular cross section. The outer link has a tip payload of variable mass and moment of inertia. The structure is instrumented with position/rate/acceleration/ sensors mounted at the articulations and at the end-point; strain-gauges are mounted along the links at several locations. Close agreement between the analytical predictions and the experimental measurements is documented for modal tests and for slew maneuvers of the structure. The design and implementation of several digital compensators to actively control the single elastic beam as well as the 2-DOF elastic structure are presented. The compensators are obtained using classical design techniques and the Linear Quadratic Gaussian/Loop Transfer Recovery (LQG/LTR) method. (kr)

AD-A227 276

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DESCRIPTORS: (U) *ELASTIC PROPERTIES, *MANIPULATORS, *SPACE TECHNOLOGY, ACCELEROMETERS, BENDING, COMPENSATORS, CROSS SECTIONS, DEFORMATION, DIGITAL SYSTEMS, DYNAMIC RESPONSE, DYNAMICS, EQUATIONS, EQUATIONS OF MOTION, EXPERIMENTAL DATA, MANEUVERS, MASS, MATHEMATICAL MODELS, MATHEMATICAL PREDICTION, MEASUREMENT, MODELS, MOMENT OF INERTIA, NONLINEAR SYSTEMS, PAYLOAD, POSITION(LOCATION), RATES, RECTANGULAR BODIES, TEST AND EVALUATION, VARIABLES.

IDENTIFIERS: (U) PE61102F, WUAFOSRD812K1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A227 213 9/3

STANFORD UNIV CA HIGH TEMPERATURE GASDYNAMICS LAB

(U) Planar Laser-Fluorescence Imaging of Combustion Gases,

90 15P

PERSONAL AUTHORS: Hanson, Ronald K.; Seitzman, Jerry M.; Paul, Phillip H.

CONTRACT NO. AFOSR-89-0065

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-1050, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Applied Physics B, v50 p441-454 1990. Original contains color plates: All DTIC and NTIS reproductions will be in black and white.

ABSTRACT: (U) An overview is provided of the planar laser-induced fluorescence (PLIF) method, which currently allows simultaneous combustion measurements at more than 10 5 flowfield points. Important advantages of the method include its relatively high signal strength, ease of interpretation, and applicability for determining several flowfield variables (including concentration, temperature, velocity, pressure and density). Example results are shown for a turbulent non-premixed flame, a spray flame a rod-stabilized premixed flame, and a diffusion flame from a fuel jet in cross-flow. Keywords: Lasers; Fluorescence; Planar structures; Combustion products. (RH) -

DESCRIPTORS: (U) *COMBUSTION PRODUCTS, *FLAMES, *LASER INDUCED FLUORESCENCE, *PLANAR STRUCTURES, COMBUSTION, DIFFUSION, FLOW FIELDS, FLUORESCENCE, GASES, HIGH STRENGTH, LASERS, MEASUREMENT, SIGNALS, SPRAYS, SYNCHRONISM, VARIABLES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A3.

AD-A227 209 7/6

PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF CHEMISTRY

(U) Liquid Crystalline Phosphazenes Bearing Biphenyl Mesogenic Groups,

90 8P

PERSONAL AUTHORS: Allcock, Harry R.; Kim, Chulhee

CONTRACT NO. AFOSR-89-0234

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-90-1048, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Macromolecules, v23 n7 p3881-3887 1990.

ABSTRACT: (U) New thermotropic liquid crystalline phosphazene cyclic trimers and high polymers have been prepared by the incorporation of biphenyl derivative units to the skeleton by oligomeric ethyleneoxy spacer units. The cyclic trimer (NP(OCH2CH2O)2C6H4C6H4CN)2)3 showed monotropic nematic schlieren texture between 102 and 59 C. The phosphazene cyclic trimers and high polymers (NP(O(CH2CH2O)3C6H4R)2)3 and n, where R = OMe, OEt, OPR-n, OPr-i, and OBu-n, have been synthesized. None of these cyclic trimers were liquid crystalline, but all the polymers showed enantiotropic liquid crystallinity. Keywords: Polymers, Liquid crystals, Polyphosphazenes, Materials. (js)

DESCRIPTORS: (U) *LIQUID CRYSTALS, *PHOSPHAZENE, BIPHENYL, CRYSTALS, LIQUIDS, POLYMERS, SCHLIEREN PHOTOGRAPHY, SKELETON, SPACERS, TEXTURE.

IDENTIFIERS: (U) Biphenyl mesogenic groups

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A227 208 11/10

CINCINNATI UNIV OH DEPT OF CHEMISTRY

(U) Reinforcement of Elastomers by the In-situ Generation of Filler Particles,

90 7P

PERSONAL AUTHORS: Mark, James E.; Schaefer, Dale W.

CONTRACT NO. AFOSR-83-0027

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-1049, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Materials Research Society Symposia Proceedings, v171 p51-56 1990.

ABSTRACT: (U) The goal of primary interest in these investigations was the development of novel methods for filing elastomeric networks. The techniques developed employ the in-situ generation of reinforcing fillers such as silica or a glassy polymer such as polystyrene either after, during, or before network formation. The reaction involves decomposition of organometallic compounds, using a variety of catalysts and precipitation conditions, or free-radical polymerization of a suitable monomer. The effectiveness of the technique is gauged by stress-strain measurements carried out on these elastomeric composites to yield values of the maximum extensibility, ultimate strength, and energy of rupture. Also of interest are calorimetric studies of the networks, to determine their crystallizability. Information on the filler particles themselves is obtained from density determinations, electron microscopy, and scattering measurements. (RH)

DESCRIPTORS: (U) *ELASTOMERS, *FILLERS, *NETWORKS, *PARTICLES, CALORIMETERS, CATALYSTS, COMPOSITE MATERIALS, DECOMPOSITION, ELECTRON MICROSCOPY, ENERGY, FREE RADICALS, GLASS, MEASUREMENT, ORGANOMETALLIC COMPOUNDS, POLYMERIZATION, POLYMERS, POLYSTYRENE, PRECIPITATION, REINFORCING MATERIALS, RUPTURE, SCATTERING, SILICON DIOXIDE, STRESS STRAIN RELATIONS.

AD-A227 208

AD-A227 208 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A227 193 5/8 6/4

EEG SYSTEMS LAB SAN FRANCISCO CA

(U) Empirical Network Model of Human Higher Cognitive Brain Functions.

DESCRIPTIVE NOTE: Final rept. 1 Apr 87-31 Mar 90,

MAR 90 207P

PERSONAL AUTHORS: Gevins, A. S.; Cutillo, B. A.; Illes, J. ; Bressler, S. L.; Brickett, P. A.

REPORT NO. EEG-88001

CONTRACT NO. F49620-87-C-0047

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR TR-90-1028

UNCLASSIFIED REPORT

ABSTRACT: (U) EEG Systems Laboratory (EEGSL) develops and applies advanced technologies for measuring neurocognitive signals in the human brain. Results during the period 1APR87 to 31MAR90 included: (1) measurement o leading indicator neuroelectric patterns preceding performance decrements in five Air Force fighter test pilots who performed difficult cognitive tasks for 10-14 hours; (2) measurement of split-second neurocognitive patterns of basic linguistic operations which distinguished letter from non-letter, word from non-word, and syntactic from non-syntactic processing; and (3) functional anatomical localization based on 124-channel evoked potential recordings and three dimensional finite-element brain models constructed from magnetic resonance images. Keywords: Cognition, Brain, Sustained mental work, Language EEG, Evoked potentials, MRI, Functional neural networks.

DESCRIPTORS: (U) *COGNITION, *ELECTROENCEPHALOGRAPHY, *MENTAL ABILITY, *PILOTS, BRAIN, DEGRADATION, HUMANS, IMAGES, LABORATORIES, LANGUAGE, LINGUISTICS, MAGNETIC RESONANCE, MODELS, NETWORKS, NEURAL NETS, RECORDING SYSTEMS, JET FIGHTERS, AIR FORCE PERSONNEL.

AD-A227 193

AD-A227 193 CONTINUED

IDENTIFIERS: (U) Evoked potentials, WUAFORS2313A4, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A227 170 21/4

CASE INST OF TECH CLEVELAND OH

(U) Solid Fuel Combustion.

DESCRIPTIVE NOTE: Final rept. 1 Aug 85-31 Oct 89,

AUG 90 82P

PERSONAL AUTHORS: T'ien, James S.

CONTRACT NO. AFOSR-85-0340

MONITOR: AFOSR, XF
TR-90-0946, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Theoretical analyses were performed on several different types of diffusion flames to study the flame radiation effect. In the first problem, a soot formation and oxidation scheme was incorporated into a turbulent diffusion flame model adjacent to a solid fuel. The computed results for the natural convective fire showed good agreement with experimentally measured solid fuel burning rate. Soot radiation increased its importance with flame height. With flames greater than 1 meter, the radiative heat flux exceeded that by convection. In the second problem, matched asymptotic expansions were employed to study the spherical diffusion flame around a droplet or solid particle with flame radiation. It was found that the importance of radiation increased with droplet radius. The theory predicted that there was a maximum droplet or particle size above which a spherical flame could not be supported due to radiative loss. In the third problem, the thermophoretic motion of small particles (e.g., soot) were studied in a stagnation-point laminar flow next to a heated plate with and without combustion. It was found that both the thermophoretic motion and this Brownian particle diffusion can have a profound effect on the particle concentration distributions. (js)

DESCRIPTORS: (U) *SOLID FUELS, ASYMPTOTIC SERIES, BROWNIAN MOTION, BURNING RATE, COMBUSTION, CONVECTION, DIFFUSION, DROPS, EXPANSION, FIRES, FLAMES, HEAT FLUX, HEIGHT, LAMINAR FLOW, LOSSES, MATCHING, MODELS, MOTION, OXIDATION, PARTICLE SIZE, PARTICLES, RADIANT HEATING, RADIATION, RADIATION EFFECTS, RADIUS(MEASURE), SOLIDS,

AD-A227 170 CONTINUED

SOOT, STAGNATION POINT, THEORY, TURBULENCE.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A227 135 9/3

STANFORD UNIV CA DEPT OF MECHANICAL ENGINEERING

(U) Simultaneous Measurements of Velocity, Temperature, and Pressure Using Rapid cw Wavelength-Modulation Laser-Induced Fluorescence of OH,

JUN 90 4P

PERSONAL AUTHORS: Chang, A. Y.; Battles, B. E.; Hanson, R. K.

CONTRACT NO. AFOSR-89-0065

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-1051, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) In high-speed flows, laser-induced fluorescence (LIF) on Doppler-shifted transitions is an attractive technique for velocity measurement. LIF velocimetry has been applied to combined single-point measurements of velocity, temperature, and pressure and two dimensional imaging of velocity and pressure. Prior to recent research using NO, LIF velocimetry in combustion related flows relied largely on the use of seed molecules. In this Letter we report simultaneous, single-point LIF measurements of velocity, temperature, and pressure using the naturally occurring combustion species OH. This experiment is an extension of earlier research in which a modified ring dye laser was used to make time resolved temperature measurements behind reflected shock waves by using OH absorption an in postflame gases by using OH LIF. A pair of fused-silica rhombs mounted on a single galvanonmeter in an intracavity-doubled Spectra-Physics 380 ring laser permit the UV output to be swept continuously over a few wave numbers at an effective frequency of 3kHz. Reprints. (js)

DESCRIPTORS: (U) *LASER INDUCED FLUORESCENCE, ABSORPTION, COMBUSTION, DOPPLER EFFECT, DYE LASERS, FLOW, GASES, HIGH VELOCITY, IMAGES, MEASUREMENT, NUMBERS, OUTPUT, REFLECTION, REPRINTS, RING LASERS, SHOCK WAVES, SYNCHRONISM, TEMPERATURE, TRANSITIONS, TWO DIMENSIONAL, ULTRAVIOLET RADIATION, VELOCITY, WAVES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A3.

AD-A227 135 CONTINUED

AD-A227 135

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A227 073 9/2 17/9

UNIVERSITY OF MANCHESTER INST OF SCIENCE AND TECHNOLOGY (UNITED KINGDOM) DEP T OF PHYSICS

(U) Polarisation Radar Studies of Precipitation: Implementation of the Technique and Data Interpretation.

DESCRIPTIVE NOTE: Final scientific rept. 15 Feb 88-14 Feb 90.

JUL 90 113P

PERSONAL AUTHORS: Illingworth, Anthony J.

CONTRACT NO. AFOSR-88-0121

PROJECT NO. 2310

TASK NO. A1

MONITOR: AFOSR, XF
TR-90-0941, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Original contains color plates: All DTIC/NTIS reproductions will be in black and white.

ABSTRACT: (U) Polarization radar observations provide information on characteristics of precipitation particles not available with conventional weather radar. Observations are reported for four parameters made with the 25m Chilbolton dish the largest steerable meteorological radar in the world. These are the first S-band measurements of the linear depolarisation ratio and the most accurate co- copolar correlations yet reported. Ten publications describe the work in more detail. This report demonstrates how the new parameters can be used to: differentiate ice from water, differentiate the different forms of ice (snow, hail pellets), locate areas where large hail is forming, and identify clouds posing a threat of triggered lightning before natural lightning or breakdown has occurred. Keywords: Polarization radar, Ice, Hail, Raindrops, Bright band, Lightning, Great Britain. (jhd)

DESCRIPTORS: (U) *METEOROLOGICAL RADAR, *POLARIZATION, *PRECIPITATION, *S BAND, *IDENTIFICATION, CLOUDS, DATA PROCESSING, GREAT BRITAIN, HAIL, ICE, LIGHTNING, MEASUREMENT, PARAMETERS, PARTICLES, PELLETS, RAINDROPS, RATIOS, SNOW, WATER, RADAR SIGNATURES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2310A1, Radar meteorology.

AD-A227 073

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A227 067 21/2 21/8 20/1

ILLINOIS UNIV AT URBANA DEPT OF AERONAUTICAL AND ASTRONAUTICAL ENGINEERING

(U) Effects of Turbulence on Stationary and Nonstationary Processes in C-Systems.

DESCRIPTIVE NOTE: Final technical rept. 1 Sep 85-31 Aug 89.

JUL 90 77P

PERSONAL AUTHORS: Beddini, Robert A.; Roberts, Ted A.

REPORT NO. AAE-87-1, UILU-ENG-870501

CONTRACT NO. AFOSR-86-0319

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR, XF
TR-90-0936, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Turbularization of an acoustic boundary-layer (Strokes layer) on impermeable and permeable surfaces is analytically considered. The theoretical approach utilizes a second-order closure model of turbulence. An approximate, closed form solution and a more comprehensive finite difference solution of the time dependent, parabolic, one dimensional governing equations are obtained. For simple acoustic boundary layers on impermeable surfaces, the approximate solution and the numerical results for the critical acoustic Mach number required for turbulent transition are qualitatively confirmed. Calculations for acoustic boundary-layers with transpiration (injection) indicate a substantial reduction for the acoustic Mach number required for transition, up to a frequency dependent limiting injection velocity. The results may provide a practical mechanism for flow related combustion instability in solid propellent rockets, since turbularization of near surface combustion zone could result in relatively low acoustic Mach numbers. An analysis of the transitional and turbulent reactive acoustic boundary layer on a homogenous solid propellant surface investigates

AD-A227 067

AD-A227 067 CONTINUED

potential mechanisms of combustion instability. A new technique is developed for the condensed phase thermal layer, in which the propellant space is mapped onto the gas space and efficiently solved using the same adaptive numerical grid. An acoustic pressure node is obtained in the absence of a mean axial flow.

DESCRIPTORS: (U) *ACOUSTICS, *TURBULENT BOUNDARY LAYER, ADAPTIVE SYSTEMS, AXIAL FLOW, COMBUSTION, COMBUSTION STABILITY, EQUATIONS, FINITE DIFFERENCE THEORY, GRIDS, HOMOGENEITY, LAYERS, MACH NUMBER, MEAN, METHODOLOGY, NEAR FIELD, NODES, NUMERICAL ANALYSIS, PERMEABILITY, SOLID PROPELLANTS, SOLUTIONS(GENERAL), SOUND PRESSURE, SURFACES, THEORY, TRANSITIONS, TRANSPIRATION, TURBULENCE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A1, *Acoustic boundary layer.

AD-A227 067

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD A227 048 21/2

CALIFORNIA UNIV BERKELEY DEPT OF MECHANICAL ENGINEERING

(U) Opposed Jet Turbulent Diffusion Flames.

DESCRIPTIVE NOTE: Final rept. 1 Oct 87-31 Mar 90,

SEP 90 68P

PERSONAL AUTHORS: Talbot, L.

CONTRACT NO. AFOSR-88-0011

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1028, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A Hydrogen-Helium mixture was chosen to investigate the structure of a counterflow diffusion flame. Reacting and non reacting conditions were studied at the same Reynolds number. To study the reaction zone structure, high speed tomography based on Mie scattering was employed using a copper vapor laser and a Fastax high speed camera. LDV measurements were also obtained. Different seeding techniques were used to visualize both the turbulent air and fuel jets. The tomographic records were digitized and recorded in a digital computer for statistical treatment. Significant differences in the wrinkle scales between the reacting and non reacting flows were found. A fractal statistical analysis of the tomography records was done to quantify these differences. Seeding of both fuel and air jets provided a mean for the evaluation of the reaction zone thickness. The strain of the reaction zone was obtained from the time resolved tomographic records. Local flame extinction and reignition were observed for different H2/Helium fuel mixtures. Keywords: Turbulent diffusion flames, Rayleigh scattering. (js)

DESCRIPTORS: (U) *JET FLAMES, AIR FLOW, COPPER, DIFFUSION, DIGITAL COMPUTERS, EXTINCTION, FLAMES, FLOW, FUELS, HIGH SPEED CAMERAS, IGNITION, JET FLOW, LASERS, MIE SCATTERING, RAYLEIGH SCATTERING, RECORDS, REYNOLDS NUMBER, SEEDING, STATISTICAL ANALYSIS, THICKNESS,

AD-A227 048 CONTINUED

TOMOGRAPHY, TURBULENCE, VAPORS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2.

AD-A227 045 12/5 20/6

HONEYWELL INC BLOOMINGTON MN PHYSICAL SCIENCES CENTER

(U) Optical Symbolic Processor for Expert System Execution.

DESCRIPTIVE NOTE: Quarterly rept. 1 Jun-31 Aug 86,

AUG 86 16P

PERSONAL AUTHORS: Derstine, Matthew; Guha, Aloke; Ramnarayan, Raja

CONTRACT NO. F49620-86-C-0082

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR, XF
TR-90-0930, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The goal of the Optical Symbolic Processor for Expert System Execution program is to develop concepts for optical computers which can perform real-time symbolic processing. The program is divided into two sections, architecture development and development of a device for reconfigurable interconnects. In the first quarter of the program, only architecture development work was performed. The approach for this phase of the program has been to examine computational models of computer languages and determine the primitive operations required. Possible optical implementations of these primitives were then examined and evaluated. In general, a top down approach was taken with the goal of a direct optical implementation of the desired primitive operations. It was found that the computational requirements of logic languages and functional languages (Section III) are primitive operations which involve manipulation of complex data structures such as graphs and trees, and that the execution of the languages can be described as manipulations of those data structures. The representation of the complex data structures imply that the representations must be exact (digital) and that some means to denote connections between data items, such as pointers, is required. Since the representation between data items is more important than the actual items stored, the most important functions involve the manipulation of

AD-A227 045

AD-A227 045 CONTINUED

the data structures. (kr)

DESCRIPTORS: (U) *COMPUTER ARCHITECTURE, *EXPERT SYSTEMS, *OPTICAL PROCESSING, COMPUTATIONS, COMPUTERS, DATA BASES, GRAPHS, LANGUAGE, LOGIC, MATHEMATICAL MODELS, OPTICAL EQUIPMENT, OPTICAL PROCESSING, PROCESSING, PROGRAMMING LANGUAGES, REAL TIME, REQUIREMENTS, SYMBOLS, TREES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305B1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A227 037 20/5

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) An Efficient Procedure for Calculating the Molecular Gradient, Using SCF-CI Semiempirical Wavefunctions with a Limited Number of Configurations.

90 14P

PERSONAL AUTHORS: Dewar, Michael J.; Liotard, Daniel A.

CONTRACT NO. AFOSR-89-0179

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-90-0982

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Molecular Structure (Theochem) v206 p123-133 1990.

ABSTRACT: (U) An effective procedure is presented for calculating analytical derivatives of the energy in Hartree-Fock-type procedures including configuration interaction in cases where the number of configurations is small. This situation commonly arises in calculations involving semiempirical models such as MNDO or AM1. Existing numerical procedures are unsatisfactory, having been designed for ab initio applications where large numbers of configurations must be included. Reprints. (jhd)

DESCRIPTORS: (U) *MOLECULAR ORBITALS, CONFIGURATIONS, DERIVATIVES(MATHEMATICS), EFFICIENCY, GRADIENTS, INTERACTIONS, MOLECULES, NUMERICAL METHODS AND PROCEDURES, REPRINTS, WAVE FUNCTIONS, HARTREE FOCK APPROXIMATION, MINDO MOLECULAR ORBITALS.

IDENTIFIERS: (U) MNDO Molecular orbitals, AMI Molecular orbitals, AB Initio calculations.

AD-A227 036 20/8

UNIVERSITY OF WESTERN ONTARIO LONDON DEPT OF PHYSICS

(U) Merged Beam Studies of the Dissociative Recombination of H(+3) Ions with Low Internal Energy.

DESCRIPTIVE NOTE: Final rept. 1 Sep 85-31 May 86,

APR 86 129P

PERSONAL AUTHORS: Mitchell, J. B.

CONTRACT NO. AFOSR-85-0279

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR TR-90-1022

UNCLASSIFIED REPORT

ABSTRACT: (U) Dissociative recombination and excitation measurements have been performed for H + 3 ions formed under a variety of Source pressures and gas mixtures. At low pressures, an r.f. trap ion source results are lower than previous measurements from a conventional source by a factor of eight. Similar remeasurements are made for H + 3 formed in an rf trap source using a he-ium hydrogen mixture. Ions used for there measurements had an internal energy of lev. Keywords: Ions, Spectroscopy, Nuclear physics. (js)

DESCRIPTORS: (U) *HELIUM, *HYDROGEN, DISSOCIATION, ENERGY, EXCITATION, GASES, INTERNAL, ION SOURCES, IONS, LOW ENERGY, LOW PRESSURE, MEASUREMENT, MIXTURES, NUCLEAR PHYSICS, PRESSURE, RADIOFREQUENCY GENERATORS, RECOMBINATION REACTIONS, SOURCES, SPECTROSCOPY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A7.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A227 018 8/10 14/2

CLARKSON UNIV POTSDAM NY DIV OF RESEARCH

(U) Fundamental Penetration Mechanisms of a Flat-Plate in Saturated Clays.

DESCRIPTIVE NOTE: Final rept. 15 Feb 88-23 Aug 90,

AUG 90 249P

PERSONAL AUTHORS: Huang, An-Bin; Bunting, Robert D.; Ahuja, Anurag

CONTRACT NO. AFOSR-88-0114

PROJECT NO. 2302

TASK NO. C1

MONITOR: AFOSR TR-90-1036

UNCLASSIFIED REPORT

ABSTRACT: (U) Flat-plate penetrometers, have become an important part of in situ testing in geotechnical engineering. However, use of flat-plate penetrometers has been highly empirical, mainly due to the lack of knowledge of soil response to the flat-plate penetration. In this project, a numerical technique capable of computing strain paths for three-dimensional penetrometers was developed. A calibration chamber system for cohesive soils and model flat-plates were fabricated. Three dimensional strain path analyses were performed for several of the flat-plate penetrometers currently being used. Results show that flat-plates can induce large strains and strain reversals at levels comparable to those of cone penetration. The characteristics of the strain field during a flat-plate penetration is influenced by both the w/t ratio and the tip apex angle. Regardless of the geometry, the pore pressure and total stress peak at the tip of the penetrometer. The pore pressure and total stress decrease sharply as the soil element passes the tip of the flat-plate. The pore pressure and total stress around the flat-plate do not increase with the plate thickness as some had suggested. For a simple flat-plate (i.e., the flat Marchetti dilatometer), the penetration-induced pore pressure is positively related to the soil rigidity index in the horizontal direction. The excess pore pressure dissipation around the flat-plate in an anisotropically consolidated clay follows an axisymmetric pattern.

DESCRIPTORS: (U) *PENETROMETERS, *SOIL MECHANICS, *SOIL TESTS, SOILS, PENETRATION, THREE DIMENSIONAL, STRAIN(MECHANICS), REVERSIBLE, CALIBRATION, CLAY, SATURATION, PORE PRESSURE, STRESSES, COMPUTATIONS, STRESS STRAIN RELATIONS.

IDENTIFIERS: (U) Flat plate penetrometers, Geotechnical engineering, Strain reversal, In situ tests, Saturated clay, PE61102F, WUAFOSR2302C1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A226 997 20/5 9/3

STANFORD UNIV CA DEPT OF MECHANICAL ENGINEERING

(U) Planar Laser-Induced Fluorescence Imaging of Shock-Heated Flows in Vibrational Nonequilibrium.

89 9P

PERSONAL AUTHORS: McMillin, B. K.; Lee, M. P.; Palmer, J. L.; Paul, P. H.; Hanson, R. K.

CONTRACT NO. AFOSR-89-0065

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-1042, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in FED, v85: Flow Visualization, p55-62 1989.

ABSTRACT: (U) Planar laser induced fluorescence imaging of nitric oxide in nonreacting shock-heated flows with vibrational nonequilibrium is reported. The images obtained provide a means to examine shock structure as well as to visualize and to measure the vibrational nonequilibrium induced by shock waves. The flows were generated within a shock tube with a test gas of 0.5% NO in nitrogen. A narrowband ArF laser tuned to excite transitions in the D from X (0,1) band of NO was used as the excitation source and the resulting broadband fluorescence was collected at 90 deg. using an intensified, 2-D photodiode array camera. Images presented include a normal incident shock; a normal reflected shock; a shock reflected from a nonplanar endwall; and a detached oblique shock formed in supersonic flow over a 2-D wedge. The vibrational relaxation imaged behind the normal incident and reflected shocks was analyzed and compared with calculations based upon relaxation data previously reported. Keywords: Laser, Fluorescence, Imaging, Shock tube, Nonequilibrium, Nitric oxide, Reprints. (jhd)

DESCRIPTORS: (U) *LASER INDUCED FLUORESCENCE, *NITROGEN OXIDES, *SHOCK WAVES, BROADBAND, EXCITATION, FLUORESCENCE, IMAGES, NARROWBAND, NITROGEN, NONEQUILIBRIUM FLOW, NONPLANAR, PLANAR STRUCTURES, REFLECTION, RELAXATION, REPRINTS, SHOCK, SHOCK TUBES, SOURCES, SUPERSONIC FLOW, MOLECULAR VIBRATION, WALLS.

IDENTIFIERS: (U) Nitric oxides.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A226 996 9/3

STANFORD UNIV CA DEPT OF MECHANICAL ENGINEERING

(U) Laser-Induced Fluorescence Imaging of Laser-Ablated Barium,

APR 90 4P

PERSONAL AUTHORS: Cappelli, M. A.; Paul, P. H.; Hanson, R. K.

CONTRACT NO. AFOSR-89-0065

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-1044, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Applied Physics Letters, v56 n8 p1715-1717, 30 Apr 90.

ABSTRACT: (U) Laser produced plasmas are now commonly used as atomic sources for thin-film deposition of low vapor pressure solids. The recent demonstration that a two-stage approach to laser ablation can lead to beam focusing and hence significant enhancement in the atomic flux suggests yet a wider range of applications which may now include basic spectroscopy on extremely low vapor pressure transition metals, normally performed with evaporable sources in conventional heat pipe ovens. Our group is now investigating the production of dense ion beams by laser resonance ionization of focused metal vapor atomic beams produced by ablation of barium and strontium. The increased ion and atomic flux densities may now permit studies of charge transfer reactions between colliding beams at volumetric rates much higher than those obtainable from collimated evaporative sources. Reprints. (js)

DESCRIPTORS: (U) *LASER INDUCED FLUORESCENCE, ABLATION, BARIUM, CHARGE TRANSFER, DEPOSITION, EVAPORATION, FOCUSING, HEAT PIPES, IMAGES, ION BEAMS, ION DENSITY, IONIZATION, LASERS, LOW PRESSURE, OVENS, PRODUCTION, REPRINTS, RESONANCE, SOLIDS, SOURCES, SPECTROSCOPY, STAGING, STRONTIUM, THIN FILMS, VAPOR PRESSURE.

AD-A226 996 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A3.

AD-A226 996

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A226 995 17/5.1 14/4 9/3

STANFORD UNIV CA DEPT OF MECHANICAL ENGINEERING

(U) Image-Intensified Photodiode Array as a Fluorescence Detector in CW-Laser Experiments.

JUL 90 9P

PERSONAL AUTHORS: Hiller, Bernhard; Paul, Phillip H.; Hanson, Ronald K.

CONTRACT NO. AFOSR-89-0065

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-1043, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Review of Scientific Instruments, v61 n7 p1808-1815 Jul 90.

ABSTRACT: (U) Imaging systems based on image intensified photodiode array cameras are excellent detectors for laser induced fluorescence experiments in fluid mechanics and combustion science. The principles of operation of such a system are described. Special attention is given to the use of an image intensifier in conjunction with cw-laser experiments. In that mode, ghost images caused by the finite phosphor decay time can contribute major systematic errors. Measurements of the phosphor decay times for exposure times between 0.1 and 100 ms (a typical range for cw-laser experiments) were conducted and show that the decay time increases with exposure time. Methods for circumventing the ghosting problem are suggested. The signal and noise analysis points to analog-to-digital converter noise (ADC) or quantization error of the camera and to photon shot noise as the dominating noise sources. The image intensifier improves time resolution and signal-to-noise ratio (SNR) by moving the system from the camera noise limit to the shot-noise limit. Once the shot-noise limit is reached, the SNR can only be improved by increasing the quantum efficiency of the intensifier, not by increasing the intensifier gain. The spatial resolution of such a system is generally limited by the photodiode array, but can be dominated by

AD-A226 995

AD-A226 995 CONTINUED

focusing errors, if lenses with low f numbers are used. (JHD)

DESCRIPTORS: (U) *PHOTODIODES, *LASER INDUCED FLUORESCENCE, *IMAGE INTENSIFICATION, *IMAGE INTENSIFIERS(ELECTRONICS), CAMERAS, CONTINUOUS WAVE LASERS, SIGNAL TO NOISE RATIO, REPRINTS, ANALOG TO DIGITAL CONVERTERS, ARRAYS, COMBUSTION, DECAY, ERRORS, EXPOSURE(GENERAL), FLUID MECHANICS, FOCUSING, GAIN, LENSES, LIMITATIONS, NOISE, OPERATION, PHOSPHORS, PHOTONS, QUANTIZATION, QUANTUM EFFICIENCY, RESOLUTION, SHOT NOISE, SOURCES, SPATIAL DISTRIBUTION, TIME, OPTICAL DETECTORS, OPTICAL IMAGES.

IDENTIFIERS: (U) *Photodiode arrays, Phosphor decay, WUAFOSR2308A3, PE61102E.

AD-A226 995

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A226 994 9/3

STANFORD UNIV CA DEPT OF MECHANICAL ENGINEERING

(U) 2-D Velocity Measurements in Supersonic Flow Using Pulsed Planar Laser-Induced Fluorescence,

89 9P

PERSONAL AUTHORS: Lee, M. P.; Paul, P. H.; Hanson, R. K.

CONTRACT NO. AFOSR-89-0065

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-1041, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in FED, v85: Flow Visualization, p101-108 1989.

ABSTRACT: (U) Planar laser induced fluorescence of NO is used to acquire 2 D images of velocity in Mach 7.2 underexpanded jet of N2 seeded with 0.5% NO. NO is excited using a pulsed excimer pumped dye laser at 226.234 nm pumping the A-X (0,0) Q1(6) line. The resultant fluorescence is imaged with an intensified 240x512 pixel solid state camera. The fluorescence is related to the velocity through the Doppler shift. A simple algorithm is used to extract velocity from the fluorescence images. The velocity data have been compared with correlations and good agreement has been found. This method for molecular velocimetry allows utilization of a laser which is spectrally broad with respect to the absorption line. Sources of error in this technique are discussed. An extension of this technique to single shot simultaneous 2 D measurements of temperature, pressure and two components of velocity is also suggested. Keywords: Laser, Fluorescence, Velocity, Supersonic, Nitric oxide, Reprints. (js)

DESCRIPTORS: (U) *LASER INDUCED FLUORESCENCE, *SUPERSONIC FLOW, ABSORPTION SPECTRA, ALGORITHMS, CAMERAS, DOPPLER EFFECT, ERRORS, FLUORESCENCE, IMAGES, LASERS, LINE SPECTRA, MOLECULES, NITROGEN OXIDES, PLANAR STRUCTURES, PULSES, REPRINTS, SOURCES, SUPERSONIC

AD-A226 994

AD-A226 994 CONTINUED

CHARACTERISTICS, VELOCIMETERS, VELOCITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A226 993 7/4

EMORY UNIV ATLANTA GA DEPT OF CHEMISTRY

(U) A Potential Surface for Ar-OH(2Sigma) and Ar-OD(2Sigma) : Fitting and Assigning Experimental D.ta with Rigorous Theory.

90 5P

PERSONAL AUTHORS: Bowman, Joel M.; Gazdy, Bela; Schafer, Pamela; Heaven, Michael C.

CONTRACT NO. AFOSR-88-0249

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XF
TR-90-0974, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physical Chemistry, v94 n6 p2226-222[illegible] 1990.

ABSTRACT: (U) We report the results of a large-scale, iteration procedure to assign and fit experimental spectra of Argon compounds. The calculations employed a new multiparameter functional form for the global potential. The parameters were varied randomly, and converged vibrational energies were obtained for each ''trial'' potential. After recognizing an inverse isotope effect, the experimental vibrational/bending energy intervals are accurately reproduced for both Ar-OH and Ar-OD. A preliminary rotational analysis is also in excellent agreement with experiment. Keywords: Physical chemistry. (js)

DESCRIPTORS: (U) *ARGON, *ISOTOPE EFFECT, ENERGY, EXPERIMENTAL DATA, GLOBAL, INVERSION, ITERATIONS, PHYSICAL CHEMISTRY, ROTATION, SPECTRA, SURFACES, VIBRATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1.

AD-A226 990 6/5

INTERNATIONAL SOCIETY FOR CHRONOBIOLOGY BELTSVILLE MD

(U) International Society for Chronobiology International Conference (19th) Held in Bethesda, Maryland on 20-24 June 1989. Abstracts.

DESCRIPTIVE NOTE: Final rept. 1 Jun 89-31 May 90,

JUN 89 98P

PERSONAL AUTHORS: Hayes, Dora K.

CONTRACT NO. AFOSR-89-0336

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1039, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chronobiologia v16 n2 p107-202, Apr-Jun 89.

ABSTRACT: (U) The XIX International Conference on Chronobiology was held in Bethesda, Md. on 20-24 June 1989. Two hundred and thirteen papers were presented covering topics from fundamental research to applications of chronobiological principals to maintaining healthy individuals. The abstracts of the papers presented were published in the April-June 1989 issue of CHRONOBIOLOGIA. That issue constitutes the final report for this project.

DESCRIPTORS: (U) *CHRONOBIOLOGY, SYMPOSIA, REPORTS, ABSTRACTS, BIOLOGICAL RHYTHMS, ANIMALS, HUMANS, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A2.

AD-A226 988 9/1 11/2

ULTRASYSTEMS DEFENSE INC IRVINE CA

(U) Heterocycles Based on Group III, IV, and V Elements, Precursors for Novel Glasses and Ceramics.

DESCRIPTIVE NOTE: Final rept. 1 Mar 85-28 Feb 90,

AUG 90 130P

PERSONAL AUTHORS: Paciorek, K. L.; Nakahara, J. H.; Masuda, S. R.; Shih, J. G.; Hoferkamp, L. A.

REPORT NO. SN-3503-F

CONTRACT NO. F49620-85-C-0042

PROJECT NO. 5037

TASK NO. 00

MONITOR: AFOSR, XF
TR-90-0917, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The general objective of this program was to explore the feasibility of synthesizing novel heterocyclics from the group of elements consisting of Boron, Carbon, Nitrogen, Aluminum, Silicon, and Phosphorous, the ultimate goal being the production of processible precursors for novel ceramics of unusual properties. The major efforts under the program were devoted to development of processible preceramic systems leading to aluminum nitride and multi-element nitride ceramics and ceramic materials. Aluminum nitride, in view of its high thermal conductivity, among other considerable properties, is of the interest in electronic applications, in particular in packaging of electronic microcircuits. (js)

DESCRIPTORS: (U) *CERAMIC MATERIALS, *THERMAL CONDUCTIVITY, ALUMINUM COMPOUNDS, BORON, CARBON, ELECTRONICS, FEASIBILITY STUDIES, HETEROCYCLIC COMPOUNDS, HIGH RATE, MICROCIRCUITS, NITRIDES, NITROGEN, PACKAGING, PHOSPHORUS, PRODUCTION, SILICON, SYNTHESIS.

IDENTIFIERS: (U) PE61102F, WUAFOSR503700.

AD-A226 988

AD-A226 968 25/4 12/9

JOHNS HOPKINS UNIV BALTIMORE MD

(U) Massively Parallel Network Architectures for Automatic Recognition of Visual Speech Signals.

DESCRIPTIVE NOTE: Final technical rept.,

90 16P

PERSONAL AUTHORS: Sejnowski, Terrence J.; Goldstein, Moise

CONTRACT NO. AFOSR-86-0246

PROJECT NO. 2305

TASK NO. B3

MONITOR: AFOSR, XF
TR-90-0949, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This research sought to produce a massively-parallel network architecture that could interpret speech signals from video recordings of human talkers. This report summarizes the project's results: (1) A corpus of video recordings from two human speakers was analyzed with image processing techniques ans used as the data for this study; (2) We demonstrated that a feedforward network could be trained to categorize vowels from these talkers. The performance was comparable to that of the nearest neighbors techniques and to trained humans on the same data; (3) We developed a novel approach to sensory fusion by training a network to transform from facial images to short-time spectral amplitude envelopes. This information can be used to increase the signal-to-noise ratio and hence the performance of acoustic speech recognition systems in noisy environments; (4) We explored the use of recurrent networks to perform the same mapping for continuous speech. Results of this project demonstrate the feasibility of adding a visual speech recognition component to enhance existing speech recognition systems. Such a combined system could be used in noisy environments, such as cockpits, where improved communication is needed. This demonstration of presymbolic fusion of visual and acoustic speech signals

AD-A226 968

AD-A226 968 CONTINUED

is consistent with our current understanding of human speech perception.

DESCRIPTORS: (U) *SPEECH RECOGNITION, *VIDEO SIGNALS, *IMAGE PROCESSING, CLASSIFICATION, PARALLEL PROCESSING, NEURAL NETS, VOWELS, PATTERN RECOGNITION, AUTOMATIC, SPEECH, VIDEO RECORDING, INFORMATION PROCESSING, ACOUSTIC SIGNALS, AUGMENTATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305B3.

AD-A226 966 7/4

UTAH UNIV SALT LAKE CITY DEPT OF MATERIALS SCIENCE AND ENGINEERING

(U) Use of D2 to Elucidate OMVPE Growth Mechanisms.

DESCRIPTIVE NOTE: Final rept. 15 Jun 87-14 Jun 90,

JUL 90 13P

PERSONAL AUTHORS: Stringfellow, G. B.

CONTRACT NO. AFOSR-87-0233

PROJECT NO. 2306

TASK NO. B1

MONITOR: AFOSR, XF
TR-90-0950, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This research project has successfully determined the reaction mechanisms for the pyrolysis of the group III precursors trimethylgallium (TMGa) and trimethylindium (TMIn) and the grup V precursors AsH3. PH3, trimethylarsine (TMAs), dimethylarsin (DMAs), triethylarsin (TEAs), diethylarsine DEAs), monoethylarsine (MEAs), tertiarybutylarsin (TBAs), and tertiarybutylophospine (TBP). The reaction mechanisms have also been studied for combinations of the group III and group V precursors which result in the production of GaAs and InP. The technique used is mass spectrometry with the pyrolysis occurring in various ambients including H2, He, and D2. The latter allows labelling of reaction mechanisms observed are surprisingly diverse. The pyrolysis temperatures for the various As precursors can be compared. Keywords: Chemical reactions. (JS)

DESCRIPTORS: (U) *CHEMICAL REACTIONS, *PYROLYSIS, GALLIUM ARSENIDES, GROWTH(GENERAL), MASS SPECTROMETRY, PRECURSORS, PRODUCTION, RESPONSE, TEMPERATURE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306B1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A226 958 5/7 5/8

HARVARD UNIV CAMBRIDGE MA DEPT OF PSYCHOLOGY

(U) Perception and Temporal Properties of Speech.

DESCRIPTIVE NOTE: Annual technical rept. Jul 89-Jul 90,

JUL 90 67P

PERSONAL AUTHORS: Gordon, Peter C.

CONTRACT NO. AFOSR-89-0461

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR
TR-90-0943

UNCLASSIFIED REPORT

ABSTRACT: (U) Two series of experiments are reported on the role of prosody in human speech comprehension. One series looked at the role of prosodic information in listeners' ability to recognize adjacent vowels and consonants cued by the common temporal feature of vowel duration. The stimuli consisted of syllables from a large sample of natural speech which listeners heard with prosodic context or without. Prosodic context was found to aid listeners in correctly attributing the phonological source of vowel duration. The second series of experiments examines the role of stress in syllable accessibility during the on-line comprehension of language and from short-term memory. During on-line comprehension stress is found to interact with lexical processing, while the effect of stress on syllable accessibility from short-term memory is not dependent on lexical effects. Partial contents: Disambiguation of segmental dependencies by extended phonetic context; and coming to terms with stress -- Effects of stress location in sentence processing.

DESCRIPTORS: (U) *SPEECH, *PERCEPTION(PSYCHOLOGY), *COMPREHENSION, AUDITORY PERCEPTION, PHONETICS, TIME DEPENDENCE, STRESSES, VOWELS, SPEECH RECOGNITION, CUES(STIMULI), PSYCHOLOGICAL TESTS, LANGUAGE, MEMORY(PSYCHOLOGY), PSYCHOACOUSTICS.

AD-A226 958 CONTINUED

IDENTIFIERS: (U) Speech comprehension, Prosody, Speech perception, Context effects(speech), Fricatives, Consonants, Listening, PE61102F, WUAFOSR2313A4.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A226 951 12/3

JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF MATHEMATICAL SCIENCES

(U) Structural Properties of Randomized Times,

APR 85 23P

PERSONAL AUTHORS: Karr, A. F.; Pittenger, A. O.

CONTRACT NO. AFOSR-82-0029

MONITOR: AFOSR, XF
TR-90-1014, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Probability Theory and Related Fields, v72 p395-415 1986.

ABSTRACT: (U) Suppose a measure mu dominates a measure eta in the ordering induced by the excessive functions of a transient Markov process. Rost shows than eta can be represented as the distribution of the process stopped at a randomized optional time and started with initial distribution mu. In this paper we introduce the shift operator to the class of randomized optional times, including the class of randomized quasi-terminal times and that of randomized terminal times. We analyze the algebraic properties of these classes and obtain some compactness results for the class of randomized quasi-terminal times. Some applications, including remplissage by hitting times, are presented. (Author) (kr)

DESCRIPTORS: (U) *MARKOV PROCESSES, *STRUCTURAL PROPERTIES, *TIME STUDIES, ALGEBRA, OPERATORS(PERSONNEL), RANDOM VARIABLES, SHIFTING, TRANSIENTS.

IDENTIFIERS: (U) *Randomized times.

AD-A226 951

AD-A226 919 12/7 12/4

DUKE UNIV DURHAM NC DEPT OF COMPUTER SCIENCE

(U) A Single Server Queue with Mixed Types of Interruptions.

DESCRIPTIVE NOTE: Rept. for 10 Sep 84-18 Dec 85,

DEC 85 23P

PERSONAL AUTHORS: Nicola, Victor F.

CONTRACT NO. AFOSR-84-0132

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-90-1011

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Acta Informatica, v23 p465-486 1986.

ABSTRACT: (U) The singer server M/G/1 queue subject to Poisson interruptions has many useful applications in computer systems modeling. The interruptions are usually characterized by their type of service-preemption discipline. This paper deals with this model in its most general setting, allowing the simultaneous presence of all types of interruptions that may be encountered in real systems. In spite of the inherent complexity of the analysis, it is possible to derive analytic closed form expressions for interesting performance measures. The results obtained are of theoretical interest as well as of practical significance. In particular, we derive the Laplace Stieltjes transform of the completion time associated with a customer's service and obtain the steady-state average number of customers in the system. An application to the modeling of checkpointing and recovery in a transactional system is considered. (Author)

DESCRIPTORS: (U) *COMPUTERIZED SIMULATION, COMPUTERS, QUEUEING THEORY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A226 919

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A226 918 20/3

STANFORD UNIV CA DEPT OF ELECTRICAL ENGINEERING

(U) Estimability and Regulability of Linear Systems,

DEC 88 8P

PERSONAL AUTHORS: Baram, Y.; Kailath, T.

CONTRACT NO. AFOSR-88-0327

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR
TR-90-0997

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on Automatic Control, v33 n12 p1116-1121 Dec 88.

ABSTRACT: (U) A linear state-space system will be said to be estimable if in estimating its state from its output the posterior error covariance matrix is strictly smaller than than the prior covariance matrix. It will be said to be regulable if the quadratic cost of state feedback control is strictly smaller than the cost when no feedback is used. Estimability and regulability are shown to be dual properties, equivalent to the nonreducibility of the Kalman filter and of the optimal linear quadratic regulator, respectively. Keywords: Reprints, Electrical engineering. (Author) (KR)

DESCRIPTORS: (U) *ELECTRICAL ENGINEERING, *SYSTEMS ANALYSIS, CONTROL, COSTS, COVARIANCE, ERRORS, FEEDBACK, KALMAN FILTERING, MATRICES(MATHEMATICS), OPTIMIZATION, QUADRATIC EQUATIONS, QUADRATIC PROGRAMMING, REGULATORS, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A6.

AD-A226 917 20/5

TEXAS CHRISTIAN UNIV FORT WORTH DEPT OF PHYSICS

(U) Oxygen Quenching of Positronium in Silica Gels,

APR 90 6P

PERSONAL AUTHORS: Hopkins, B.; Zerda, T. W.

CONTRACT NO. AFOSR-90-0165

MONITOR: AFOSR
TR-90-0996

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physics Letters A, v145 n2,3 p141-145, 2 Apr 90.

ABSTRACT: (U) Positronium decay rates have been measured in silica gels of various pore sizes, at two temperatures, 297 and 77 K, and as a function of oxygen concentration. The cross section of positronium quenching due to a monolayer of adsorbed O2 at 77 K is found to be at least two orders of magnitude smaller than the cross section for conversion quenching by subsequent layers, and is similar to that observed in gaseous oxygen. No evidence of chemical quenching has been observed. The positronium 'atom' occurs in two ground states. Parapositronium (p - Ps) is the singlet state with total spin of zero and it has a self annihilation lifetime in vacuum of 0.125 ns, and decays via 2 gamma emission. Orthopositronium (o-Ps) is the triplet state with total spin of one. Its free space lifetime is much longer, 140 ns, and decays via 3 gamma emission. (JS)

DESCRIPTORS: (U) *ATOMS, *POSITRONIUM, ANNIHILATION REACTIONS, CHEMICALS, CONCENTRATION(CHEMISTRY), CONVERSION, CROSS SECTIONS, DECAY, GASES, GELS, GROUND STATE, LIFE SPAN(BIOLOGY), OXYGEN, QUENCHING, RATES, SILICON DIOXIDE, TEMPERATURE.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A226 916 7/4

TEXAS CHRISTIAN UNIV FORT WORTH DEPT OF PHYSICS

(U) Effect of Solvents on the Hydrolysis Reaction of Tetramethyl Orthosilicate.

90 6P

PERSONAL AUTHORS: Zerda, T. W.; Hoang, G.

CONTRACT NO. AFOSR-90 0165

MONITOR: AFOSR, XF
TR-90-0995, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemistry of Materials, v2 n4 p372-376 1990.

ABSTRACT: (U) High-pressure Raman spectroscopy is used to monitor the hydrolysis reaction of tetramethyl orthosilicate, TMOS, in solutions with methanol, acetonitrile, acetone, dioxane and formamide. The rate constants are experimentally determined for different temperatures and pressures. The volume of activation, dielectric constant, and vibrational frequency shifts are experimentally determined and discussed in terms of solvent properties. The acceleration of hydrolysis in formamide is explained in terms of interactions between formamide and TMOS. (JS)

DESCRIPTORS: (U) *HYDROLYSIS, ACCELERATION, ACETONES, ACETONITRILE, ACTIVATION, CONSTANTS, DIELECTRIC PROPERTIES, DIOXANES, FREQUENCY SHIFT, HIGH PRESSURE, INTERACTIONS, METHANOLS, RAMAN SPECTROSCOPY, RATES, RESPONSE, SOLVENTS, VIBRATION, VOLUME.

AD-A226 916

AD-A226 895 20/2

GE AEROSPACE SYRACUSE NY ELECTRONICS LAB

(U) Pseudomorphic InGaAs Materials.

DESCRIPTIVE NOTE: Final rept. Mar 88-Jul 90.

JUL 90 48P

PERSONAL AUTHORS: Ballingall, J. M.; Ho, P.; Martin, P.; Yu, T.

CONTRACT NO. F49620-88-C-0054

PROJECT NO. 2305

TASK NO. C1

MONITOR: AFOSR, XF
TR-90-1037, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of this program is to evaluate the dependence of pseudomorphic InxGa1-xAs quality on epitaxial growth conditions and InxGa1-xAs composition. All of the structures were fabricated by molecular beam epitaxy (MBE). The effects of different growth conditions were evaluated with a combination of characterization techniques, including Hall effect, Shubnikov-de Hass, photoreflectance, microwave reflectance, photoluminescence, transmission electron microscopy (TEM), and in-situ reflection high energy electron diffraction (RHEED). Critical layer thickness is shown to be a function of MBE growth temperature. Also, the interruption of InXGa1-xAs growth with a few monolayers of GaAs is shown to smoothen the InxGa1-xAs surface to provide strain relief, substantially extending the critical layer thickness. Modulation enhanced epitaxy is demonstrated to yield high quality pseudomorphic structures at temperatures as low as 300 C. Extensive materials characterization and modeling were applied to the structures, and excellent agreement was often obtained without resorting to adjustable parameters. Keywords: Epitaxy, Pseudomorphic heterostructures, Stained layer superlattices, Dislocations, Photoluminescence, Hall effect, Electron diffraction, Photoreflectance. (JS)

AD-A226 895

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A226 895 CONTINUED

DESCRIPTORS: (U) *EPITAXIAL GROWTH, *GALLIUM ARSENIDES, *STRUCTURES, DISLOCATIONS, ELECTRON DIFFRACTION, ELECTRON MICROSCOPY, ENVIRONMENTS, GROWTH(GENERAL), HALL EFFECT, LAYERS, MICROWAVES, MODULATION, MOLECULAR BEAMS, PARAMETERS, PHOTOLUMINESCENCE, REFLECTANCE, TEMPERATURE, THICKNESS, TRANSMITTANCE, YIELD.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305C1.

AD-A226 893 21/5

PURDUE UNIV LAFAYETTE IN THERMAL SCIENCES AND PROPULSION CENTER

(U) Research as part of the Air Force Research in Aero-Propulsion Technology (AFRAPT) Program.

DESCRIPTIVE NOTE: Final technical rept. 15 Aug 88-14 Oct 90,

AUG 90 5P

PERSONAL AUTHORS: Fleeter, Sanford

CONTRACT NO. AFOSR-88-0261

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-0961, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Nine graduate students participated in the AFRAPT Program during this time period. Two students have completed their M.S.M.E. programs and are currently employed at one of the AFRAPT participating companies. Four students have nearly completed their thesis research, with one student having withdrawn. The other two continuing and new students have initiated their thesis research and are making good progress.

DESCRIPTORS: (U) *GAS TURBINES, COMBUSTION, AIR FORCE RESEARCH, RESEARCH MANAGEMENT, STUDENTS, AERONAUTICS, AIR FORCE RESEARCH, PROPULSION SYSTEMS, STUDENTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A226 869 12/1 25/2 25/3

TEXAS UNIV AT AUSTIN DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Some Applications of Probability and Statistics in Communication Theory and Signal Processing.

DESCRIPTIVE NOTE: Final technical rept. 1 Nov 86-30 Apr 90,

AUG 90 22P

PERSONAL AUTHORS: Wise, Gary L.

CONTRACT NO. AFOSR-86-0026

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR, XF
TR-90-1034, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This Final Technical Report constitutes a summary of the research performed under Grant AFSOR-86-0026 during the period November 1, 1986 through April 30, 1990. First we present a list of the personnel involved in the research effort. Then in the following section we present a brief summary of the research results that have been achieved. Each of these results is well documented in technical articles, and references to these articles are made in the summary of the research results. Keywords: Estimation theory, Martingale convergence theorem. (KR)

DESCRIPTORS: (U) *INFORMATION THEORY, *SIGNAL PROCESSING, *STRUCTURAL ANALYSIS, *COMMUNICATION AND RADIO SYSTEMS, CONVERGENCE, ESTIMATES, PROBABILITY, THEOREMS, THEORY.

IDENTIFIERS: (U) PE61102F, WUAFOSR23046, *Applied.

AD-A226 869

AD-A226 866 7/3

RENSSELAER POLYTECHNIC INST TROY NY DEPT OF CHEMISTRY

(U) Cyclic (AlN)n Compounds as Precursors to Aluminum Nitride: Synthesis and Structure of ((CH3)2AlNH2)3 and the Planar Species ((t-C4H9)2AlNH2)3,

89 12P

PERSONAL AUTHORS: Interrante, Lenard V.; Sigel, Gary; Garbauskas, Mary; Hejna, Carolyn

CONTRACT NO. F49620-85-K-0019

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-1024, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The crystal and molecular structures of organic compounds, ((CH3) (2 AlNH2)3 1 and ((t-C4 H9) 3 2, have been determined in connection with their investigation as possible precursors to aluminum nitride. Both compounds have an (AlN)3 ring-structure with distorted tetrahedral geometries for the ring Al and N atoms. The distortion from tetrahedral geometry is most pronounced for the N atoms where the endocyclic Al-N-Al bond angles average 125.3 for 1 and 134.2 for 2. The (AlN) 3 ring in 1 is in a skew-boat conformation with no unusual intra- or intermolecular contacts. Compound 2 on the other hand exhibits an unprecedented planar (AlN)3 ring as required by a crystallographic three-fold symmetry axis. Keywords: Ceramic precursor, Aluminum nitride, Dialkylaluminum amides, Crystal structure, Molecular structure. (JS)

DESCRIPTORS: (U) *ORGANIC COMPOUNDS, ALUMINUM COMPOUNDS, AMIDES, ATOMS, CERAMIC MATERIALS, CRYSTAL STRUCTURE, DISTORTION, GEOMETRY, MOLECULAR STRUCTURE, NITRIDES, PLANAR STRUCTURES, PRECURSORS, SYNTHESIS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

AD-A226 866

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A226 865 11/6

RENSSELAER POLYTECHNIC INST TROY NY DEPT OF CHEMISTRY

(U) Preparation of Silicon Carbide/Aluminum Nitride Ceramics Using Organometallic Precursors.

FEB 90 7P

PERSONAL AUTHORS: Czekaj, Corinna L.; Hackney, Michael L.; Hurley, William J., Jr.; Interrante, Leonard V.; Sigel, Gary A.

CONTRACT NO. F49620-85-K-0019, N00014-86-K-0770

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-1023, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The prospect of alloying SiC with other covalently bonded refractory materials, such as AlN, to achieve microstructural control or alter properties has been previously noted and realized under certain conditions. However because of the high melting points nd low solid-state diffusivities which are characteristic of these materials, currently available ceramic processing methods, such as sintering or hot-pressing, are of limited practical value as a means of obtaining chemically and microstructurally homogeneous materials in useful final form. The influences of the nature of the precursor and processing conditions on the structure, composition, and purity of the SiC/AlN materials are discussed. Keywords: Silicon carbide, Precursors, Aluminum nitride, Solid solutions, Pyrolysis. (JS)

DESCRIPTORS: (U) *ALUMINUM COMPOUNDS, *NITRIDES, *ORGANOMETALLIC COMPOUNDS, *SILICON CARBIDES, BONDING, CERAMIC MATERIALS, CONTROL, HIGH TEMPERATURE, HOMOGENEITY, MATERIALS, MELTING POINT, METHODOLOGY, MICROSTRUCTURE, PRECURSORS, PROCESSING, PURITY, PYROLYSIS, REFRACTORY MATERIALS, SINTERING, SOLID SOLUTIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

AD-A226 865

AD-A226 863 13/11 20/8

ROCHESTER UNIV NY DEPT OF CHEMISTRY

(U) Femtosecond Pump-Probe Spectroscopy of Polyatomic Molecules in Condensed Phases.

JUN 90 21P

PERSONAL AUTHORS: Yan, Yi J.; Mukamel, Shaul

CONTRACT NO. AFOSR-90-0054

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR, XF
TR-90-0977, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physical Review A, v41 n11 p6485-6504, 1 Jun 90.

ABSTRACT: (U) A theory for ultrafast pump-probe spectroscopy of large polyatomic molecules in condensed phases is developed. A multimode Brownian oscillator model is used to account for high-frequency molecular vibrations and local intermolecular modes as well as collective solvent motions. A semi-classical picture is provided using the density matrix in Liouville space. The pump field creates a doorway state that propagates for a specified time interval, and the spectrum is calculated by finding its overlap with a window state, prepared by the probe pulse. The doorway and the window states are wave packets in phase space. For high-frequency modes and with long pulses they are expanded in the vibronic eigenstates, whereas for low-frequency modes and with impulsive pulses the Wigner (phase-space) representation is more adequate. Conditions for the observation of quantum beats, spectral diffusion, and solvation dynamics (dynamical Stokes shift) are specified. (JS)

DESCRIPTORS: (U) *POLYATOMIC MOLECULES, *PUMPS, BEAT SIGNALS, BROWNIAN MOTION, CONDENSATION, DIFFUSION, DYNAMICS, HIGH FREQUENCY, LOW FREQUENCY, MODELS, MOLECULAR VIBRATION, MOLECULE MOLECULE INTERACTIONS, MOTION, MULTIMODE, OBSERVATION, OSCILLATORS, OVERLAP, PHASE, PICTURES, PROBES, PULSES, QUANTUM THEORY, SHIFTING.

AD-A226 863

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A226 863 CONTINUED

SOLVATION, SOLVENTS, SPECTRA, TIME INTERVALS, WAVE PACKETS, WINDOWS.

IDENTIFIERS: (U) WUAFOSR2303B3, P[illegible]61102F.

AD-A226 862 20/5

AEROCHEM RESEARCH LABS INC PRINCETON NJ

(U) The Role of Ions in Soot Formation,

90 12P

PERSONAL AUTHORS: Calcote, H. F.; Keil, D. G.

CONTRACT NO. F49620-88-C-0007

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-0925, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The ionic mechanism of soot formation assumes rapid growth of ions from the chemiion C3H3+ to form increasingly larger ions which either become incipient charged soot particles or combine with electrons (produced in the chemiion step) to produce incipient neutral soot particles. A comparison of the rates of soot formation demonstrates that the rate of ion formation with the rates of soot formation demonstrates that the rate of ion formation exceed the rate of soot formation, and that the rate at which ions disappear is approximately equal to the rate at which soot is formed. In addition, ions are observed to disappear at the same point in the flame at which soot is observed to form. The time it takes to add 10 carbon atoms, i.e., to grow from C10 to C20 species, is compared for the neutral and ionic mechanisms. These times, using experimentally measured species concentrations and typical rate coefficients, are comparable for the two mechanisms. Keywords: Soot formation; Ionic mechanism; Ion-molecule reactions. (JS)

DESCRIPTORS: (U) *IONS, *SOOT, *EVOLUTION(DEVELOPMENT), CHARGED PARTICLES, CHEMICAL REACTIONS, COEFFICIENTS, ELECTRONS, GROWTH(GENERAL), HIGH RATE, MOLECULES, NEUTRAL, PARTICLES, RATES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A226 861 20/8

EMORY UNIV ATLANTA GA DEPT OF CHEMISTRY

(U) Spectroscopy of the AlAr van der Waals Complex: Rotationally Resolved B 2 Sigma(+) yields X 2 Pi(1/2) Electronic Transitions,

MAR 90 7P

PERSONAL AUTHORS: McQuaid, Michael J.; Gole, James L.

CONTRACT NO. AFOSR-88-0249

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XF
TR-90-0975, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v92 n5, p2733-2739, 1 Mar 90.

ABSTRACT: (U) Diatomic van der Waals molecules consisting of metal atom bound to a rare gas atom (MRg) have received considerable attention in recent years. Studies of the electronic spectra of these molecules have led to determinations of the interatomic potential energy curves for both ground and electronically excited states. These data are of value as they may be used in the analysis of dynamical events such as collisional line broadening, electronic energy transfer, and molecular beam scattering. Additionally, spectroscopic characterization of these molecules provides a data base against which ab initio and semi-empirical theoretical models of weak bonding interactions may be tested. An interesting property of many MRg molecules in dramatic increase in binding energy, and decrease in the equilibrium internuclear separation, which accompanies electronic excitation. This occurs because bonding in the ground state is predominantly mediated by dispersion forces, while the stability of the excited state may be enhanced by increased metal atom polarizability, partial charge transfer, and orbital overlap effects. (JS)

DESCRIPTORS: (U) *ELECTRON TRANSITIONS, ATOMS, BEAMS(RADIATION), BONDING, CHARGE TRANSFER, DATA BASES,

AD-A226 861

AD-A226 861 CONTINUED

DYNAMICS, ELECTRON ENERGY, ELECTRONICS, ELECTRONS, ENERGY TRANSFER, EXCITATION, GROUND STATE, INTERACTIONS, LOW STRENGTH, METALS, MODELS, MOLECULAR BEAMS, MOLECULES, NUCLEAR BINDING ENERGY, ORBITS, OVERLAP, POLARIZATION, RARE GASES, SCATTERING, SPECTRA, SPECTROSCOPY, THEORY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A226 860 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) Optimally Bounded Score Functions for Generalized Linear Models with Applications to Logistic Regression.

86 13P

PERSONAL AUTHORS: Stefanski, L. A.; Carroll, R. J.; Ruppert, D.

MONITOR: AFOSR, XF
TR-90-0935, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Biometrika, v73 n2 p413-424 1986.

ABSTRACT: (U) We study optimally bounded score functions for estimating regression parameters in a generalized linear model. Our work extends results obtained by Krasker and Welsch (1982) for the linear model and provides a simple proof of Krasker and Welsch's first-order condition for strong optimality. The application of these results to logistic regression is studied in some detail with an example given comparing the bounded-influence estimator with maximum likelihood. Keywords: Reprints. (kr)

DESCRIPTORS: (U) *MATHEMATICAL MODELS, *REGRESSION ANALYSIS, *ESTIMATES, LINEAR SYSTEMS, LINEARITY, LOGISTICS, MAXIMUM LIKELIHOOD ESTIMATION, PARAMETERS, REPRINTS, OPTIMIZATION.

AD-A226 850 7/4

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) Comments on a Comparison of AM1 with the Recently Developed PM3 Method.

90 3P

PERSONAL AUTHORS: Dewar, Michael J.; Healy, Eamonn F.; Holder, Andrew J.; Yuan, Yate-Ching

CONTRACT NO. AFOSR-89-0179

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-90-0983, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Computational Chemistry, v11 n4 p541-542 1990.

ABSTRACT: (U) A reparametrized version (PM3) of AM1 has recently been reported and the results for several hundred molecules compared with those from AM1 itself. The comparison implied that PM3 represents a significant improvement over the earlier treatment. The apparently poor performance of AM1 is, however, due to the inclusion of 'AM1' results for elements (Al, P, S) for which AM1 parameters were unavailable. If these are omitted, PM3 is seen to be only marginally better than AM1. Since this conclusion refers only to a specific set of stable molecules, it is not clear whether even this small improvement will apply to other species or studies of reactions. Keywords: Chemical reactions, Inorganic chemistry, Synthesis(Chemistry). (JS)

DESCRIPTORS: (U) *CHEMICAL REACTIONS, INORGANIC CHEMISTRY, MOLECULES, STABILITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EV159A

AD-A226 849 6/5

MISSISSIPPI STATE UNIV MISSISSIPPI STATE DEPT OF BIOLOGICAL SCIENCES

(U) Relationship of Selected Functions of Activated Macrophages.

DESCRIPTIVE NOTE: Final rept. 15 Jun 89-14 Jun 90,

AUG 90 45P

PERSONAL AUTHORS: Pruett, Stephen B.

CONTRACT NO. AFOSR-89-0361

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR, XF
TR-90-0940, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of this project was to examine relationships of selected metabolic capabilities and key immunological functions of activated marcrophages. Consistent association or a single example of dissociation between two parameters would indicate or eliminate the possibility of commo· induction pathways or functional interdependence of these parameters. Results indicate that thiol production, capacity to produce H2O2, and tumor cytotoxicity are often induced by the same stimuli, but, in one case, H2O2 production was not affected by stimuli which increased the other two parameters. The commonly accepted idea that highly activated (tumoricidal) macrophages are poor antigen processing and presenting cells was confirmed, but some tumoricidal activity was noted in macrophages which were excellent antigen processing and presenting cells. Keywords: Macrophage, Nitric oxide, Nitrite, Nitrate, Tumor cytolysis, Listeria monocytogenes, Immunotoxicology. (js)

DESCRIPTORS: (U) *MACROPHAGES, ACTIVATION, ANTIGENS, CONSISTENCY, CYTOLOGY, DISSOCIATION, FUNCTIONS, IMMUNOLOGY, INDUCTION SYSTEMS, LISTERIA MONOCYTOGENES, METABOLISM, NEOPLASMS, NITRATES, NITRITES, NITROGEN OXIDES, PARAMETERS, PATHOLOGY, PROCESSING, PRODUCTION,

AD-A226 849

AD-A226 849 CONTINUED

STIMULI, THIOLS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A5, Cytotoxins.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A226 848 5/8

CHICAGO UNIV IL DEPT OF PSYCHOLOGY

(U) Using Memory to Estimate Dates and Locations.

DESCRIPTIVE NOTE: Final technical rept. 1 Feb 88-31 Jan 90.

AUG 90 67P

PERSONAL AUTHORS: Huttenlocher, Janellen; Hedges, Larry

CONTRACT NO. AFOSR-88-0125

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR, XF
TR-90-0942, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A model of multi-level coding of spatial location was developed. According to the model people impose categories on homogeneous spaces. In coding location, they report both a particular value and a category value. These values are combined in reporting location. Categories have boundaries which constrain the particular values reported, and particular values are weighted with prototypic central values in estimation. The proposed estimation process, it is shown, increases accuracy, while introducing bias. Four experiments were carried out in which people reported the location of a dot in a circle. The pattern of bias revealed that people imputed horizontal and vertical axes dividing the circle into quadrants. Using the mathematical formulation of the category model, we showed that the model fully explained the pattern of bias observed in the studies. (KR)

DESCRIPTORS: (U) *MEMORY(PSYCHOLOGY), ACCURACY, AXES, BIAS, CODING, ESTIMATES, FORMULAS(MATHEMATICS), HOMOGENEITY, HORIZONTAL ORIENTATION, MEMORY DEVICES, PATTERNS, POSITION(LOCATION), QUADRANTS, SPATIAL DISTRIBUTION, VALUE, VERTICAL ORIENTATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A4.

AD-A226 848

AD-A226 847 7/4

STANFORD UNIV CA

(U) A Pyrolysis Mechanism for Ammonia,

90 25P

PERSONAL AUTHORS: Davidson, D. F.; Kohse-Hoeinghaus, K.; Chang, A. Y.

CONTRACT NO. AFOSR-89-0065

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-1045, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in International Jnl. of Chemical Kinetics, v22 p513-535 1990.

ABSTRACT: (U) The mechanism of NH3 pyrolysis was investigated over a wide range of conditions behind reflected shock waves. Quantitative time-history measurements of the species NH and NH2 were made using narrow-linewidth laser absorption. These records were used to establish an improved model mechanism for ammonia pyrolysis. The risetime and peak concentrations of NH and NH2 in this experimental database have also been summarized graphically. Rate coefficients for several reactions which influence the NH and NH2 profiles were fitted in the temperature range 2200 K to 2800 K. Keywords: Ammonia, Kinetics, pyrolysis, Shock tube, Laser absorption. (JS)

DESCRIPTORS: (U) *AMMONIA, *PYROLYSIS, ABSORPTION, COEFFICIENTS, DATA BASES, HISTORY, LASERS, MEASUREMENT, MODELS, RANGE(EXTREMES), RATES, REFLECTION, SHOCK TUBES, SHOCK WAVES, TIME.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A3.

AD-A226 847

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A226 846 7/6

PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF CHEMISTRY

(U) Influence of Different Organic Side Groups on the Thermal Behavior of Polyphosphazenes: Random Chain Cleavage, Depolymerization, and Pyrolytic Cross-Linking.

90 9P

PERSONAL AUTHORS: Allcock, Harry R.; McDonnell, Gayann S.; Riding, Geoffrey H.; Manners, Ian

CONTRACT NO. AFOSR-89-0234

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-90-0979, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemistry of Materials, v2 n4 p425-432 1990.

ABSTRACT: (U) The thermal behavior of several polyphosphazenes was examined. The polymers were studied by thermogravimetric analysis between 50 and 100 C, by bulk pyrolysis in a tube furnace over the same temperature range, and by thermolysis in a closed system. The volatile products were analyzed by a combination of P NMR spectroscopy, vapor-phase chromatography, and mass spectrometry. Three distinct processes were identified: (1) random chain cleavage of the phosphazene backbone, (2) depolymerization to form small molecule cyclic phosphazenes, and (3) cross-linking reactions to form a network structure. Keywords: Phosphazenes, Polymers, Polyphosphazenes, Thermolysis, Ceramics, Depolymerization. (JS)

DESCRIPTORS: (U) *ORGANIC RADICALS, *PHOSPHAZENE, *THERMAL PROPERTIES, CHAINS, CHEMICAL REACTIONS, CHROMATOGRAPHY, CLEAVAGE, CROSSLINKING(CHEMISTRY), DEPOLYMERIZATION, FURNACES, MASS SPECTROMETRY, MOLECULES, NETWORKS, POLYMERS, PYROLYSIS, RANGE(EXTREMES), SIDES, SPECTROSCOPY, TEMPERATURE, THERMOGRAVIMETRIC ANALYSIS,

AD-A226 846

AD-A226 846 CONTINUED

VAPOR PHASES, VOLATILITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2, Polyphosphazene.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A226 845 20/2

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) Modification of DEWAR-PI to Include Ring Strain,

90 10P

PERSONAL AUTHORS: Dewar, Michael J.; Dennington, Roy D., II

CONTRACT NO. AFOSR-89-0179

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-90-0980, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in International Jnl. of Quantum Chemistry, v37 p589-597 1990.

ABSTRACT: (U) Previous work has shown that the heats of unstrained conjugated molecules can be reproduced with surprising accuracy by a semiempirical SCF MO treatment (DEWAR-PI) based on the Pariser-Parr-Pople (PPP) pi SCF Mo Approximation. The original version failed to allow for rising strain. This deficiency has now been remedied in a new version (DEWARPI2). Crystallography. (JS)

DESCRIPTORS: (U) *CRYSTALLOGRAPHY, ACCURACY, MOLECULES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A226 840 20/5

COLUMBIA UNIV NEW YORK

(U) In Situ Kinetics Measurements of Surfactant Adsorption on Colloidal Alumina Using ESR Spectroscopy,

JUL 90 5P

PERSONAL AUTHORS: Malbrel, C. A.; Somasundaran, P.; Turro, N. J.

CONTRACT NO. AFOSR-90-0049

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-90-0962, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Colloid and Interface Science, v137 n2 p600-603 Jul 90.

ABSTRACT: (U) An electron spin resonance spectroscopy technique is employed to investigate in situ the kinetics of surfactant adsorption on colloidal particles. Using this technique, it was found that 40% of the adsorption of Aerosol OT at the alumina/cyclohexane interface takes place within 5 s after addition of the surfactant to the suspension. Keywords: Surfactant; Macromolecules, Adsorption; Aerosol, Kinetics; Colloidal systems. (jes)

DESCRIPTORS: (U) *SPECTROSCOPY, ADSORPTION, AEROSOLS, ALUMINUM OXIDES, COLLOIDS, CYCLOHEXANES, INTERFACES, KINETICS, MACROMOLECULES, MEASUREMENT, PARTICLES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A226 839 20/13

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

(U) A New Procedure for 'Up-Grading' the Nicalon Polycarbosilane and Related Si-H Containing Organosilicon Polymers,

90 4P

PERSONAL AUTHORS: Seyferth, Dietmar; Sobon, Christine A.; Borm, Jutta

CONTRACT NO. AFOSR-89-0040

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-90-0953, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in New Jnl. of Chemistry, v14 n6/7 p545-547 1990.

ABSTRACT: (U) Photochemical and thermal reactions of small amounts (0.25-2wt%) of polynuclear metal carbonyls (Ru3(CO)12,Fe3)CO12,OS3(CO)12,CO2(CO)8,CO4(CO)12,Rh6(CO)16) serve to cross-link Si-H containing organosilicon polymers. As a result, when the products of these reactions are pyrolyzed, the ceramic residue yields are increased considerably over those obtained with the original polymers. The organosilicon polymers studied most were the Nicalon polycarbosilane and the (CH3SiH)x(CH3SI)y)n polysilane. (js)

DESCRIPTORS: (U) *THERMAL PROPERTIES, METAL CARBONYLS, ORGANIC COMPOUNDS, PHOTOCHEMICAL REACTIONS, POLYMERS, SILICON COMPOUNDS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A226 838 7/6

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

(U) Borasilazane Polymeric Precursors for Borosilicon Nitride,

JUL 90 4P

PERSONAL AUTHORS: Seyferth, Dietmar; Plenio, Herbert

CONTRACT NO. AFOSR-89-0040

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-90-0954, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the American Ceramics Society, v73 n7 p2131-2133 Jul 90.

ABSTRACT: (U) The reaction of H3B.S(CH3)2with the (CH3SiHNH)n cyclic oligomers obtained by ammonolysis of methyldichlorosilane (CH3SiHCL2) results in evolution of hydrogen and formation of cross-linked products that contain borazine rings as well as boron atoms that are linked to three nitrogen atoms. Pyrolysis of the products in a stream of argon gives a high yield of a black borosilicon carbonitride, whereas pyrolysis in a stream of ammonia gives white borosilicon nitride in high yield. Keywords: Borosilicates, Boron nitride, Silazanes, Pyrolysis, polymers. (js)

DESCRIPTORS: (U) *POLYMERS, AMMONIA, ARGON, ATOMS, AZINES, BORON, BORON COMPOUNDS, BORON NITRIDES, CROSSLINKING(CHEMISTRY), CYCLES, EVOLUTION(GENERAL), HIGH RATE, HYDROGEN, NITRIDES, NITROGEN, OLIGOMERS, PRECURSORS, PYROLYSIS, RINGS, STREAMS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A226 837 7/6

RENSSELAER POLYTECHNIC INST TROY NY DEPT OF CHEMISTRY

(U) Preparation of a Polymeric Precursor to Silicon Carbide via Ring-Opening Polymerization: Synthesis of Poly(methylchorosilylene)methylene) and Poly(silapropylene),

89 6P

PERSONAL AUTHORS: Wu, Hui-Jung; Interrante, Leonard V.

CONTRACT NO. AFOSR-89-0439

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-0958, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemistry of Materials, v1 n5 p564-568 1989.

ABSTRACT: (U) A high molecular weight linear polycarbosilane has been prepared by ring-opening polymerization of 1,3-dichloro-1,3-dimethyl-1,3-disilacyclobutane. Reduction of this polymer with LiAlH4 yields the corresponding polysilapropylene. The structures of these polymers and their monomeric precursors have been investigated by IR and H, 13C, and 29Si NMR spectroscopy, mass spectra, and GPC. The results of these studies are consistent, in the case of the polymers, with expectations for high molecular weight linear polymers with atactic configurations. The pyrolysis of the high molecular weight poly(silapropylene) was studied by TGA and was found to give a 66% ceramic yield after thermal processing at 400 C, suggesting that this polymer has potential for use as a precursor to SiC ceramics. Keywords: Polycarbonsilane, SiC Precursor, Ring opening, Polymerization, Polysilapropylene. (js)

DESCRIPTORS: (U) *POLYMERS, CERAMIC MATERIALS, CONFIGURATIONS, HEAT, MASS SPECTRA, OPENING(PROCESS), POLYMERIZATION, PRECURSORS, PROCESSING, PYROLYSIS, RINGS, SILICON CARBIDES, SPECTROSCOPY.

AD-A226 837 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

AD-A226 837

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A226 836 20/5

NEW ORLEANS UNIV LA DEPT OF CHEMISTRY

(U) Anomalous Energy Effects Associated with the Presence of Aza Nitrogens and Nitro Substituents in Some Strained Systems,

90 9P

PERSONAL AUTHORS: Murray, Jane S.; Seminario, Jorge M.; Lane, Pat; Politzer, Peter

CONTRACT NO. AFOSR-88-0068

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR, XF
TR-90-0963, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Molecular Structure (Theochem), v207 p193-200 1990.

ABSTRACT: (U) We have used an ab initio SCF molecular orbital approach in conjunction with the isodesmic reaction procedure to investigate anomalous energy effects in strained aza systems and some of their nitro derivatives. The introduction of nitrogens into strained molecular frameworks is found to confer added degrees of stability. IN general this increases with the number opf nitrogens in a series of similar molecules. Further stabilization results from N-nitro substitution and the mononitration of secondary carbons; however the polynitration of systems containing highly strained tertiary carbons has a marked destabilizing effect. Keywords: Ab initio self-consistent-field molecular orbital calculations; Isodesmic reactions; Strained aza systems; Nitro derivatives; Strain energy. (js)

DESCRIPTORS: (U) *MOLECULAR ORBITALS, *MOLECULES, ANOMALIES, CARBON, CHEMICAL DERIVATIVES, ENERGY, NITRO RADICALS, NITROGEN, RESPONSE, SECONDARY, STABILIZATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B3.

AD-A226 836

AD-A226 835 20/5

VANDERBILT UNIV NASHVILLE TN DEPT OF CHEMISTRY

(U) Theory of Multicenter Partitioning of Molecular Energies,

JUN 90 8P

PERSONAL AUTHORS: Ewig, Carl S.

CONTRACT NO. AFOSR-86-0146

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR, XF
TR-90-0952, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v92 n11 p6620-6626, 1 Jun 90.

ABSTRACT: (U) The theory of analyzing molecular energies, as found from ab initio computations, in terms of the contributions from specific sets of atoms or centers is discussed. It is shown that the basis-function expansion of molecular wavefunctions in general leads to energetic interactions involving only one- through four-center terms. For the special case of self-consistent-field energies the formulas for the energy terms are given explicitly and several numerical properties are presented, including the differences that arise in chemical reactions. Expressions are also given for the multicenter resolution of correlation energies employing second-order perturbation theory. Keywords: Molecular energies, Perturbation theory, Energy partitioning. (JS)

DESCRIPTORS: (U) *ENERGETIC PROPERTIES, *MOLECULES, ATOMS, COMPUTATIONS, CORRELATION, ENERGY, INTERACTIONS, NUMERICAL METHODS AND PROCEDURES, PERTURBATION THEORY, RESOLUTION, WAVE FUNCTIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B3.

AD-A226 835

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A226 834 7/3

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) Acidity of Carboxylic Acids: Due to Delocalization or Induction?

AUG 89 4P

PERSONAL AUTHORS: Dewar, Michael J.; Krull, Karen L.

CONTRACT NO. AFOSR-89-0179

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-90-0981, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the Chemical Society, Chemical Communications, n4 p333-334 1990.

ABSTRACT: (U) Calculations for vinylogues of formic acid and vinyl alcohol indicate that their acidities can be explained in terms of resonance stabilization of the conjugate anions, as would be expected in terms of current theory. Keywords: Carboxylic acids, Organic chemistry. (JS)

DESCRIPTORS: (U) *CARBOXYLIC ACIDS, *ORGANIC CHEMISTRY, ACIDS, ANIONS, FORMIC ACID, PH FACTOR, RESONANCE, STABILIZATION, THEORY, VINYL ALCOHOL.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A226 833 7/2

EMORY UNIV ATLANTA GA DEPT OF CHEMISTRY

(U) Fluorescence Decay and Non-Radiative Relaxation Dynamics of the A 2 sigma(+) States of OH-Ar and OD-Ar,

APR 90 6P

PERSONAL AUTHORS: Kulk, Sudhir K.; Lin, Yaomin, Heaven, Michael C.

CONTRACT NO. AFOSR-88-0249

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XF
TR-90-0973, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters, v167 n6 p597-601, 13 Apr 90.

ABSTRACT: (U) Spectra of the A 2sigma(+) - X 2pi transitions of OH-Ar and OD-Ar have been observed in the gas phase and in cryogenic rare-gas matrices. Laser-induced fluorescence spectra of gas-phase OH/D-Ar showed two distinct vibrational progressions associated with motion of the Argon atom. Rotationally resolved spectra for bands of the lower energy progression revealed contours that were consistent with linear molecules. This progression, which was also observed for matrix-isolated OH/D-Ar, has been unambiguously assigned to the OH(D)-Ar stretch mode of the A state. (js)

DESCRIPTORS: (U) *ARGON, ATOMS, CRYOGENICS, DECAY, DYNAMICS, FLUORESCENCE, LASER INDUCED FLUORESCENCE, MATRIX THEORY, MOLECULES, RARE GASES, RELAXATION, SPECTRA, VAPOR PHASES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A226 832 6/4 5/8

TENNESSEE UNIV MEMPHIS DEPT OF ANATOMY AND NEUROBIOLOGY

(U) Changes in Somatosensory Responsiveness in Behaving Monkeys

DESCRIPTIVE NOTE: Annual rept. no. 2, 1 Jul 89-30 Jun 90,

JUL 90 24P

PERSONAL AUTHORS: Nelson, Randall J.

CONTRACT NO: AFOSR-88-0179

PROJECT NO: 2312

TASK NO: A2

MONITOR: AFOSR, XF
TR-90-0956, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Four research goals were accomplished: (1) It was determined that sensory responsiveness of primary somatosensory (SI) cortical neurons to vibratory stimuli is quantitatively different depending upon whether monkeys make wrist movements in response to the stimuli or withhold movement. (2) For a special class of SI neurons, it was determined that activity occurring before movement is comprised of a reactivation of the neuron's sensor response and a presumably centrally generated component. (3) It was determined that sensory responsiveness and premovement activity are elevated when behavioral conditions are unpredictable as compared to when they are predictable. (4) It was determined that human subjects can acquire a positional target by wrist movements more quickly if vibratory go-cues are presented in addition to the illumination of a visual signal lamp. The neurophysiological experiments suggest that the responsiveness of SI neurons is profoundly affected by behavioral conditions and an animal's expectation of correct performance. The human psychophysical experiments suggest that the addition of vibratory go-cues to control systems may have benefits without seeming to degrade performance.

DESCRIPTORS: (U) *MOTOR REACTIONS, *REACTION TIME, NERVE CELLS, WRIST, CUES(STIMULI), VIBRATION, RHESUS MONKEYS,

AD-A226 832 CONTINUED

HUMANS, VISUAL SIGNALS, RESPONSE(BIOLOGY), PERFORMANCE TESTS, MODIFICATION, CEREBRAL CORTEX, PERCEPTION, NEUROPHYSIOLOGY, TARGET ACQUISITION, CONTROL SYSTEMS, PSYCHOPHYSICS.

IDENTIFIERS: (U) Somatosensory cortical neurons, Response gating, Cortical neuronal responses, PE61102F, WUAFSOR2312A2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A226 831 9/5

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS INC PISCATAWAY NJ

(U) Technology Issues in Free-Space Optical Processing.

DESCRIPTIVE NOTE: Final rept. 15 Feb-14 Oct 89,

OCT 89 7P

PERSONAL AUTHORS: Wangemann, Robert T.

CONTRACT NO. AFOSR-89-0257

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR, XF
TR-90-0951, AFOSR

UNCLASSIFIED REPORT

DESCRIPTORS: (U) *ELECTROOPTICS, *OPTICAL CIRCUITS, SYMPOSIA, LASER APPLICATIONS, COMPUTER ARCHITECTURE, DYNAMIC RANGE, NEURAL NETS.

IDENTIFIERS: (U) WUAFOSR2305B1, Quantum wells, Photorefractive materials.

AD-A226 831

AD-A226 830 12/5

MARYLAND UNIV COLLEGE PARK DEPT OF COMPUTER SCIENCE

(U) Experimentation in Software Engineering.

DESCRIPTIVE NOTE: Technical rept.,

NOV 85 38P

PERSONAL AUTHORS: Basili, Victor R.; Selby, Richard W., Jr.; Hutchens, David H.

REPORT NO. CS-TR-1575

CONTRACT NO. F49620-80-C-0001

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-0933, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Experimentation in software engineering supports the advancement of the field through an iterative learning process. In this paper we present a framework for analyzing most of the experimental work performed in software engineering over the past several years. We describe a variety of experiments in the framework and discuss their contribution to the software engineering discipline. Some useful recommendations for the application of the experimental process in software engineering are included. Keywords: Software technology measurement and evaluation, Data collection and analysis, Software metrics, Controlled experiment, Experimental design, Empirical study. (KR)

DESCRIPTORS: (U) *EXPERIMENTAL DESIGN, *SOFTWARE ENGINEERING, COMPUTER PROGRAMS, CONTROL, DATA ACQUISITION, ITERATIONS, LEARNING, MEASUREMENT, SUPPORTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A2.

AD-A226 830

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A226 829 20/4

CORNELL UNIV ITHACA NY

(U) Unsteady Separation over Maneuvering Bodies.

DESCRIPTIVE NOTE: Final rept. 1 Oct 89-31 Jan 90,

AUG 90 21P

PERSONAL AUTHORS: Shen, S. F.; Wu, T.; Xiao, Z.; Kim, J. S.

CONTRACT NO. AFOSR-88-0229

PROJECT NO. 2307

TASK NO A3

MONITOR: AFOSR, XF
TR-90-0948, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Development of a new boundary layer code has reached the status to permit meaningful applications. Computations have been carried out for the initiation of separation in the symmetry plane of a prolate spheroid of slenderness ratio 1/4, impulsively started into forward motion at zero incidence and also at 50 degrees angle. This case serves as validation by comparing with previously published results of Xu and Wang (ref.1), and also demonstrates that our method gives information of flow near the rear stagnation point not available in the literature. More studies have been performed on the optimization of surface suction to delay or prevent the unsteady separation for an impulsively started circular cylinder. Here the methodology should be of interest. Work on an unsteady three-dimensional thin-layer Navier-Stokes code, however, is progressing slowly. Keywords: Unsteady separation, three dimensional moving body, Separation control. (jhd)

DESCRIPTORS: (U) *FLOW SEPARATION, *UNSTEADY FLOW, BOUNDARY LAYER, COMPUTATIONS, INFORMATION EXCHANGE, MOTION, OPTIMIZATION, STAGNATION POINT, SUCTION, SURFACES, SYMMETRY, THREE DIMENSIONAL, VALIDATION, NAVIER STOKES EQUATIONS, BOUNDARY LAYER CONTROL.

IDENTIFIERS: (U) PE61102F, WUAFOSR2307A3.

AD-A226 829

AD-A226 828 6/4 23/3

MARYLAND UNIV COLLEGE PARK

(U) Signal Processing and Recognition in Adaptive Neural Networks.

DESCRIPTIVE NOTE: Annual rept. no. 2, 1 Aug 89-31 Jul 90,

AUG 90 6P

PERSONAL AUTHORS: Shamma, Shihab; Krishnaprasad, P. S.

CONTRACT NO. AFOSR-88-0204

PROJECT NO. 2313

TASK NO. A8

MONITOR: AFOSR, XF
TR-90-0964, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This research can be subdivided into four areas: (1) Models and neurophysiology of the auditory cortex. This includes mappings of physiological responses to sound, psychoacoustical studies, and mathematical models of the data. (2) Implementations of the cochlear and other auditory models both in DSP and VLSI forms. (3) Unsupervised learning algorithms applied to problems in sound segmentation, timbre characterization, and pitch extraction. (4) Applications of wavelet transforms to the analysis of neural networks.

DESCRIPTORS: (U) *SIGNAL PROCESSING, *AUDITORY PERCEPTION, NEURAL NETS, ADAPTIVE SYSTEMS, NEUROPHYSIOLOGY, CEREBRAL CORTEX, MATHEMATICAL MODELS, PSYCHOACOUSTICS, COCHLEA, LEARNING, ALGORITHMS, AUDITORY SIGNALS, SOUND PITCH, RESPONSE(BIOLOGY), LABORATORY ANIMALS.

IDENTIFIERS: (U) Auditory cortex, PE61102F, WUAFOSR2313A3.

AD-A226 828

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A226 827 20/4

MICHIGAN UNIV ANN ARBOR

(U) Drop/Gas Interactions in Dense Sprays.

DESCRIPTIVE NOTE: Annual rept. Aug 89-Aug 90,

AUG 90 6P

PERSONAL AUTHORS: Faeth, G. M.

CONTRACT NO. AFOSR-89-0516

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-0959, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Two drop/gas interactions important in the near-injector dense region of sprays are being studied: (1) turbulence modulation, which is the direct generation or modification of turbulence by drop motion, and (2) secondary drop breakup, an important rate-controlling process in dense sprays. Effects of turbulence modulation were measured in homogeneous flows generated by particles falling in stagnant air and water baths. The flow was analyzed with a simple stochastic approach, involving linear superposition of randomly-arriving particle velocity fields. Guided by the theory, unified correlations of turbulence properties were achieved for the measurements. Further progress requires more information about particle wake properties at modest Reynolds numbers in turbulent fields: this is the main focus of current work. Secondary drop breakup is being studied using a shock tube and various drop generators, emphasizing near-limit breakup which is most relevant to dense sprays. Work thus far has concentrated on definition of deformation and shear breakup regimes. This will be followed by study of breakup dynamics and outcomes using holocinematography instrumentation that was recently developed in this laboratory. Keywords: Multiphase flow, Homogeneous turbulence, Drop breakup. (jhd)

DESCRIPTORS: (U) *MULTIPHASE FLOW, *SPRAYS, *TURBULENCE,

AD-A226 827

AD-A226 827 CONTINUED

*PHOTOGRAPHIC ANALYSIS, AIR, CORRELATION, DEFORMATION, DYNAMICS, FLOW, HIGH DENSITY, HOMOGENEITY, MODULATION, PARTICLES, REYNOLDS NUMBER, SHEAR PROPERTIES, SHOCK TUBES, STAGNATION, STOCHASTIC PROCESSES, WAKE, HOLOGRAPHY, CINEMATOGRAPHY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2, Holocinematography.

AD-A226 827

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A226 826 6/4

YALE UNIV NEW HAVEN CT DEPT OF OPHTHALMOLOGY AND VISUAL SCIENCE

(U) Limits of Human Visual Discrimination: Toward a General Model of Visual Geometry.

DESCRIPTIVE NOTE: Final rept. 1 Jan 86-31 Dec 89,

MAR 90 10P

PERSONAL AUTHORS: Hirsch, Joy

CONTRACT NO. AFOSR-86-0077

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR, XF
TR-90-0965, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The goal of this investigation was to understand the neural computations that mediate the precision of human spatial vision. We approached this goal along three interrelated lines of research: (1) direct investigation of human and monkey retinal sampling mosaics; (2) psychophysical measurements of the precision of human spatial vision; and (3) computer simulations of human visual processes based on 'biologically correct' sampling lattices and 'behaviorally constrained neural models of human spatial information processing.

DESCRIPTORS: (U) *SPACE PERCEPTION, *VISUAL PERCEPTION, PRECISION, PHOTORECEPTORS, RETINA, SAMPLING, PATTERNS, TWO DIMENSIONAL, NEURAL NETS, PSYCHOPHYSICS, MONKEYS, HUMANS, COMPUTERIZED SIMULATION.

IDENTIFIERS: (U) Spatial vision, Webers law, Pe E51102F, WUAFOSR2313A5.

AD-A226 826

AD-A226 825 12/3 9/1

STANFORD UNIV CA INFORMATION SYSTEMS LAB

(U) Studies in Statistical Signal Processing.

DESCRIPTIVE NOTE: Final rept. 1 Jul 88-30 Jun 90,

JUN 90 34P

PERSONAL AUTHORS: Kailath, Thomas

CONTRACT NO. AFOSR-88-0327

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR, XF
TR-90-0955, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The primary objective of our research is to develop efficient and numerically stable algorithms for nonstationary signal processing problems by understanding and exploiting special structures, both deterministic and stochastic, in the problems. We also strive to establish and broaden links with related disciplines, such as cascade filter synthesis, scattering theory, numerical linear algebra, and mathematical operator theory for the purpose of cross fertilization have led to new results both in estimation theory and in these other fields, e.g., to new algorithms for triangular and QR factorization of structured matrices, new techniques for root location and stability testing, new realizations for multiple-input/multiple-output (MIMO) transfer functions, and new recursions for orthogonal polynomials on the unit circle and the real line as well as on other curves. (KR)

DESCRIPTORS: (U) *SIGNAL PROCESSING, *STATISTICAL PROCESSES, ALGORITHMS, CIRCLES, ESTIMATES, FILTERS, LINEAR ALGEBRA, MATHEMATICS, NUMERICAL ANALYSIS, OPERATORS(MATHEMATICS), ORTHOGONALITY, POLYNOMIALS, POSITION(LOCATION), SCATTERING, STABILITY, STRUCTURES, SYNTHESIS, TEST AND EVALUATION, THEORY, TRANSFER FUNCTIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A6.

AD-A226 825

AD-A226 824 6/4

OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS

(U) Demodulation Processes in Auditory Perception.

DESCRIPTIVE NOTE: Final rept. 1 Dec 88-30 Nov 89,

MAR 90 6P

PERSONAL AUTHORS: Feth, Lawrence L.

CONTRACT NO. AFOSR-89-0227

PROJECT NO. 2313

TASK NO. A6

MONITOR: AFOSR, XF
TR-90-0966, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The overall goal of this project is to understand the ability of the human listener to extract information from complex, time-varying sounds such as speech, music or other environmentally important signals. Specifically, we are interested in the listener's ability to process modulations of frequency and amplitude which are thought to carry the information of such signals. This report represents the continuation and extension of work begun at the University of Kansas in 1987. Preliminary work to determine the temporal acuity of normal hearing listeners for spectrally-dynamic signals is complete. Pilot work on processing of frequency transitions in a 'Proving frequency' paradigm has been started; and work on listeners with cochlear hearing impairments has been added to the scope of work undertaken on the project.

DESCRIPTORS: (U) *AUDITORY PERCEPTION, AUDITORY ACUITY, HUMANS, DEMODULATION, AUDITORY SIGNALS, SIGNAL PROCESSING, INFORMATION PROCESSING.

IDENTIFIERS: (U) Listening, PE61102F, WUAFOSR2313A6.

AD-A226 824

AD-A226 823 6/5

PRINCETON UNIV NJ

(U) Bioreactivity: Studies on a Simple Brain Stem Reflex in Behaving Animals.

DESCRIPTIVE NOTE: Final rept. 1 Jun 87-31 May 90,

AUG 90 7P

PERSONAL AUTHORS: Jacobs, Barry L.

CONTRACT NO. AFOSR-87-0301

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-0967, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A major problem in attempting to understand complex physiological processes, such as brain neuromodulation, or complex behavioral processes, such as arousal, is finding a simple system that will permit such analyses. The brain stem masseteric (jaw closure) reflex in cats in such a system. It is simple, containing only one synapse in brain, and receives dense inputs from two neurochemical systems important in neuromodulation and arousal. Initial pharmacologic studies showed that locally applied norepinephrine facilitated the reflex response. More importantly, physiologic conditions, known to activate the brain norepinephrine system, also facilitated the response. This latter finding was shown to be causal, rather than correlative, by a study which found that the facilitation could be blocked by prior destruction of the norepinephrine input specifically tp the reflex circuitry. These data represent the first definitive example of an activational effect in an intact and behaving organism being attributable to a particular central neurotransmitter acting at a specific brain site. (js)

DESCRIPTORS: (U) *BRAIN, *NEUROTRANSMITTERS, ANIMALS, BEHAVIOR, CATS, CIRCUITS, CLOSURES, INPUT, MOUTH, NEUROCHEMISTRY, NOREPINEPHRINE, PHARMACOLOGY, PHYSIOLOGY, REFLEXES, RESPONSE, SITES, SYNAPSE, VASOMOTOR REFLEXES.

AD-A226 823

AD-A226 823 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A2.

AD-A226 822 17/5 9/3 20/6

ARIZONA STATE UNIV TEMPE DEPT OF MECHANICAL AND AEROSPACE ENGINEERING

(U) Research on Certain Aspects of Laser Diffraction Particle Size Analysis Relevant to Autonomous Self-Diagnosing Instrumentation.

DESCRIPTIVE NOTE: Final rept. 1 Oct 84-31 May 90,

JUL 90 24P

PERSONAL AUTHORS: Hirleman, E. D.

CONTRACT NO. AFOSR-84-0187

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR, XF
TR-90-0972, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The results of a multi-year research effort addressing fundamental scientific issues relevant to the application of laser diagnostic methods as on-line sensors in next-generation propulsion systems are summarized. The overall objective of this research effort was to contribute to the scientific knowledge base necessary to characterize and then extend the capabilities of near-forward scattering (laser-diffraction) particle sizing techniques in terms of application as intelligent sensors capable of on-line, autonomous, and self-diagnosing operation in hostile propulsion system environments. The project scope encompassed three research areas: (1) steering or deflection of the probe laser beam due to refractive index (temperature or concentration) gradients, (2) inverse scattering algorithms, and (3) multiple scattering and measurements in optically thick media. The important technical contributions of this project included: development and demonstration of a concept which allows on-line configuration of optimal detector arrays using transmission-mode spatial light modulators and which can obviate the beam steering problem; derivation of the optimal scaling law for Fraunhofer diffraction particle sizing systems which integrated the

AD-A226 822 CONTINUED

optical detector array geometry and the inversion software; systematic formulation and synthesis of the family of integral transform solutions to the inverse Fraunhofer diffraction particle sizing problem and development of a new integral transform; development of a radiation transfer model for near-forward scattering by optically-thick particle media; and development of a general solution and technique for solving the inverse scattering problem for optically-thick dispersions of particles large compared to the wavelength. (jhd)

DESCRIPTORS: (U) *DIAGNOSTIC EQUIPMENT, *LASER APPLICATIONS, *LIGHT SCATTERING, ADVERSE CONDITIONS, ALGORITHMS, ARRAYS, BEAM STEERING, COMPUTER PROGRAMS, CONFIGURATIONS, DEFLECTION, DIAGNOSIS(GENERAL), FORMULATIONS, GEOMETRY, INVERSE SCATTERING, INVERSION, LASER BEAMS, LASERS, METHODOLOGY, MODELS, ONLINE SYSTEMS, OPTICAL DETECTORS, OPTICAL EQUIPMENT, OPTIMIZATION, PARTICLE SIZE, PROBES, PROPULSION SYSTEMS, RADIATIVE TRANSFER, REFRACTIVE INDEX, SCALING FACTOR, SOLUTIONS(GENERAL), SYNTHESIS.

IDENTIFIERS: (U) *Laser diagnostics, Fraunhofer diffraction.

AD-A226 822

AD-A226 816 21/3 20/9 9/3

OHIO STATE UNIV COLUMBUS DEPT OF AERONAUTICAL AND ASTRONAUTICAL ENGINEERING

(U) IR and FIR Laser Diagnostics for Plasma Thrusters Using a CW CO2 Radiation Source.

DESCRIPTIVE NOTE: Final rept. 1 May 89-30 Apr 90,

JUL 90 42P

PERSONAL AUTHORS: York, Thomas M.

CONTRACT NO. AFOSR-89-0297

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR, XF
TR-90-1030, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The accomplishments during this contract period have been related to the development of a multi-beam interferometer system, which would utilize a CO2 laser system for high sensitivity, to eventually be used to diagnose plasma in the electromagnetic expansion region of a plasma thruster. Since the application of interest is a 1/4 Scale MPD experiment, funded by NASA, where plasma is poorly known, the CO2 laser interferometer will first be tested with a single beam on a DC discharge experiment whose plasma characteristics are well known. That experiment has been assembled and tested. The CO2 laser system has been tested and found to be satisfactory. Keywords: Carbon dioxide lasers, Plasma Diagnostics, Plasma thrusters. (jhd)

DESCRIPTORS: (U) *INTERFEROMETERS, *PLASMA DIAGNOSTICS, *PLASMA ENGINES, *LASER BEAMS, CARBON DIOXIDE LASERS, DIAGNOSIS(GENERAL), DIRECT CURRENT, ELECTROMAGNETISM, EXPANSION, FAR INFRARED RADIATION, HIGH SENSITIVITY, LASER APPLICATIONS, MULTIPLE BEAMS(RADIATION), PLASMAS(PHYSICS), REGIONS, THRUSTERS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A1, Plasma thrusters.

AD-A226 816

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A226 815 7/2

BRISTOL UNIV (UNITED KINGDOM) DEPT OF INORGANIC CHEMISTRY

(U) Heteronuclear Metal Cluster Compounds Synthesis and Reactivity.

DESCRIPTIVE NOTE: Final rept. Mar 86-Jul 90,

AUG 90 22P

PERSONAL AUTHORS: Stone, F. G.

CONTRACT NO. AFOSR-86-0125

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XF
TR-90-0960, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This Final Report describes the synthesis and characterisation of compounds containing metal-metal bonds between dissimilar transition elements. The new compounds reported included species with chains or rings of metal atoms, involving tungsten or molybdenum bonded to the elements nickel, platinum, rhodium, or iridium. The Report also describes numerous mixed-metal compounds in which the metal-metal bonds are bridged by the carbaborane group C2B9H9R2 (R = H or Me). A variety of unprecedented molecular structures have been identified by X-ray crystallographic studies. Keywords: Cluster compounds of platinum, Nickel, Molybdenum, Tungsten, Rhodium, Iridium, Iron, Ruthenium, Gold. (Js)

DESCRIPTORS: (U) *CLUSTERING, *METAL METAL BONDS, ATOMS, CHAINS, CRYSTALLOGRAPHY, GOLD, IRIDIUM, IRON, MOLECULAR STRUCTURE, MOLYBDENUM, NICKEL, PLATINUM, REACTIVITIES, RHODIUM, RINGS, RUTHENIUM, SYNTHESIS, TRANSITION METALS, TUNGSTEN, X RAYS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A226 809 20/10

SCIENTIFIC RESEARCH ASSOCIATES INC GLASTONBURY CT

(U) Studying Quantum Phase-Based Electronic Devices.

DESCRIPTIVE NOTE: Final rept. 20 May 87-14 Jun 90,

AUG 90 107P

PERSONAL AUTHORS: Grubin, H. L.; Cahay, M.; Kreskovsky, J. P.

REPORT NO. SRA/R90-910023-F

CONTRACT NO. F49620-87-C-0055

PROJECT NO. 2306

TASK NO. B1

MONITOR: AFOSR, XF
TR-90-0923, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A study was undertaken to examine, theoretically, quantum phase-based electronic device. The study was implemented through examination of moments of the Wigner Distribution Function, time dependent solutions to Schrodingers equation in two dimensions and solutions to the equation of motion of the Density Matrix. Solutions were obtained using numerical methods. A variety of problems were considered including simulation of resonant tunneling structures, electron diffraction through an aperture in a potential well, and examination of the Aharanov-Bohm effect. (rrh)

DESCRIPTORS: (U) , DISTRIBUTION FUNCTIONS, ELECTRON DIFFRACTION, EQUATIONS, MOMENTS, NUMERICAL METHODS AND PROCEDURES, RESONANCE, SIMULATION, SOLUTIONS(GENERAL), STRUCTURES, TIME DEPENDENCE, TUNNELING.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306B1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A226 795 12/3

OKLAHOMA STATE UNIV STILLWATER DEPT OF CHEMISTRY

(U) Correspondence of Canonical and Microcanonical Rate Constants Using Variational Transition State Theory for Simple Bond Fissions.

JUL 90 10P

PERSONAL AUTHORS: Schranz, Harold W.; Raff, Lionel M.; Thompson, Donald L.

CONTRACT NO. AFOSR-89-0085

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR, XF
TR-90-0969, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters, v171 n1,2 p68-76, 27 Jul 90.

ABSTRACT: (U) The efficient evaluation of microcanonical and canonical variational transition state rate constants by Markov sampling techniques is discussed. It is well known that, in the evaluation of canonical rate constants, sampling the full phase space of the system is unnecessary and that an equivalent and far more efficient procedure is to perform a Markov walk over configuration space. It is shown that an analogous improvement in efficiency is possible in the case of microcanonical rate constants. The close relationship of canonical and microcanonical average is observed. Keywords: Reprints. (Author) (RH)

DESCRIPTORS: (U) *RATES, *SAMPLING, *TRANSITIONS, CONSTANTS, EFFICIENCY, REPRINTS, THEORY.

IDENTIFIERS: (U) WUAFOSR2303B3, PE61102E.

AD-A226 795

AD-A226 794 20/13

VANDERBILT UNIV NASHVILLE TN DEPT OF CHEMISTRY

(U) Accuracy in Ab Initio Reaction-Energy Computations. 1. Compounds of First-Row Elements.

90 18P

PERSONAL AUTHORS: Van Wazer, John R.; Kello, Vladimir; Hess, B. ., Jr.; Ewig, Carl S.

CONTRACT NO. AFOSR-86-0146

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR, XF
TR-90-0968, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physical Chemistry, v94 n15 p5604-5710 1990.

ABSTRACT: (U) Ab initio enthalpy computations were carried out for over 40 gas-phase diamagnetic molecules, including 18 hydrocarbons. All employed optimized geometries, a wide range of basis sets and a series of electron correlation approximations based on perturbation theory (through MP4SDTQ) and the coupled-cluster model (through CCSDT). The energies of forming the various molecules from the nuclei and electrons were calculated from experimental data and compared with the various ab initio values. The enthalpies at 298K of chemical reactions between molecules were considered in terms of the disagreement between the experimental and theoretical enthalpies, with emphasis on generic classes of reactions. The generic reactions showed up regularities in disagreements between theory and experiment. Reasons for occasional large disagreement were probed. Keywords: Reaction energy, Enthalpies, Electron correlation, Thermodynamics. (JS)

DESCRIPTORS: (U) *CHEMICAL REACTIONS, *ENTHALPY, *THERMODYNAMICS, ACCURACY, APPROXIMATION(MATHEMATICS), COMPUTATIONS, CORRELATION, ELECTRONS, ENERGY, EXPERIMENTAL DATA, MOLECULES, NUCLEI, OPTIMIZATION, PERTURBATION THEORY, RANGE(EXTREMES), RESPONSE.

AD-A226 794

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A226 794 CONTINUED

IDENTIFIERS: (U) WUAFOSR2303B3, PE61102F.

AD-A226 793 12/6 5/1

ARIZONA STATE UNIV TEMPE DEPT OF MATHEMATICS

(U) (DURIP) Exploring and Controlling Spatio Temporal Chaos Under Complex Structures through Visualization: A Mini-Supercomputer Approach.

DESCRIPTIVE NOTE: Final rept. 1 Dec 88-30 Nov 89,

NOV 89 4P

PERSONAL AUTHORS: Trotter, William T.

CONTRACT NO. AFOSR-89-0155

PROJECT NO. 3842

TASK NO. A5

MONITOR: AFOSR, XF
TR-90-1035, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The goal of the AFOSR DURIP Grant was to assist the Mathematics Program at ASU in acquiring equipment for an Advanced Graphics Computing Facility. Our computers have made possible a breakthrough in unravelling the topology and geometry of some critical phenomena in turbulence, which closely blend chaotic dynamics with classical moderate turbulence. Interactive graphics visualization enabled us to describe the qualitative global nature of numerical solutions and interpret key features from the huge volume of numerical output. (Author) (kr)

DESCRIPTORS: (U) *INTERACTIVE GRAPHICS, *APPLIED MATHEMATICS, *VISUAL PERCEPTION, COMPUTERS, DYNAMICS, FACILITIES, NUMERICAL ANALYSIS, OUTPUT, SOLUTIONS(GENERAL), STRUCTURES, TOPOLOGY, TURBULENCE, VOLUME.

IDENTIFIERS: (U) WUAFOSR3842A5, PE61104D, *Minisupercomputers, *Visualization.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A226 792 11/4

TORONTO UNIV (ONTARIO) DEPT OF CHEMICAL ENGINEERING AND APPLIED CHEMISTRY

(U) Mesomechanical Model for Fibre Composites.

DESCRIPTIVE NOTE: Annual progress rept. 1 Jul 89-31 May 90.

JUL 90 21P

PERSONAL AUTHORS: Piggott, Michael R.

CONTRACT NO. AFOSR-89-0365

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR, XF
TR-90-1040, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Carbon fibre interfaces with epoxy resins have been examined using the pull out method. This method can now be reliably and reproducibly used to measured the bond strength. Shear strengths can be very high, up to nearly 150 MPa in individual experiments, with average values for 50 or more tests of up to 100 MPa. The strengths are little different for Hercules AS1, AS2 and AS4. The sizing appears to have little effect (but this needs to be confirmed). The strengths observed are up to three times the shear strength of the polymer. Carbon and glass interfaces with thermoplastics (polyethylene and nylon) can also be measured using this method. Results here are up to four times the estimated shear strength of the polymer. To explain the high results an equivalent work of fracture is involved. This has never exceeded 300 Jm-2, indicating that the interphases are quite brittle. Keywords: Fibre reinforces polymers, Composites. (js)

DESCRIPTORS: (U) *FIBER REINFORCED COMPOSITES, BONDING, CARBON, CARBON FIBERS, EPOXY RESINS, ESTIMATES, FRACTURE(MECHANICS), GLASS, INTERFACES, NYLON, POLYETHYLENE, POLYMERS, SHEAR STRENGTH, STRENGTH(MECHANICS), THERMOPLASTIC RESINS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2302B1.

AD-A226 792

AD-A226 791 21/2

CALIFORNIA INST OF TECH PASADENA

(U) Investigation of Combustion in Large Vortices.

DESCRIPTIVE NOTE: Final rept. Sep 86-Sep 89,

AUG 90 13P

PERSONAL AUTHORS: Zukoski, Edward E.

CONTRACT NO. AFOSR-84-0286

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-1038, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This research consists of an experimental study of the time dependent combustion in vortex structures. Large vortices were formed utilizing pulsed flow over a downstream facing step. The technique for simultaneous shadowgraph, chemiluminescence, and laser doppler velocimeter measurements has been developed and is used regularly. For a pressure oscillation of fixed amplitude, the diameter of the vortex grows linearly with time at a rate that increases linearly with the pressure amplitude of the oscillation generating the vortex formation. The onset of chemiluminescence - and we believe combustion - is delayed for several milliseconds, close to our estimates for the chemical time for the systems under study here. Keywords: Vortex burning, Unsteady combustion, Shock enhanced mixing, Supersonic combustion, Hypersonic ramjet. (jhd)

DESCRIPTORS: (U) *SUPERSONIC COMBUSTION, *VORTICES, AMPLITUDE, CHEMILUMINESCENCE, DOPPLER SYSTEMS, FLOW, HYPERSONIC VEHICLES, LASER VELOCIMETERS, MEASUREMENT, OSCILLATION, PRESSURE, PULSES, RAMJET ENGINES, SPARK SHADOWGRAPH PHOTOGRAPHY, STRUCTURAL PROPERTIES, SYNCHRONISM, TIME DEPENDENCE, VARIABLE PRESSURE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2, Hypersonic ramjet engines.

AD-A226 791

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A226 790 20/12

CORNELL UNIV ITHACA NY

(U) Ultra High Speed Compound Semiconductors and Real Time Signal Processing.

DESCRIPTIVE NOTE: Final rept. 1 May 88-30 Apr 90,

JUN 90 16P

PERSONAL AUTHORS: Krusius, J. P.

CONTRACT NO. F49620-87-C-0044

PROJECT NO. 2305

TASK NO. A9

MONITOR: AFOSR, XF
TR-90-0914, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report is the final report on research conducted under the auspices of the Joint Services Electronics Program at Cornell University. The research is grouped under two themes: (a) ultra high speed compound semiconductors, and (b) real time signal processing. Results on OMVPE materials growth, femtosecond laser probing of hot carriers, and ensemble Monte Carlo simulations are reported on under the first theme. Accomplishments on VLSI algorithms, fault tolerant architectures, and architectures with multiple functional units for signal processing are given under the second theme. (rh)

DESCRIPTORS: (U) , ALGORITHMS, ARCHITECTURE, CHARGE CARRIERS, FAULTS, GROWTH(GENERAL), HIGH ENERGY, LASERS, MATERIALS, MONTE CARLO METHOD, PROCESSING, REAL TIME, SIGNAL PROCESSING, SIMULATION, TIME SIGNALS, TOLERANCE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305A9.

AD-A226 790

AD-A226 789 9/5 12/9

BDM INTERNATIONAL INC MCLEAN VA

(U) Analog Optical Neural Nets: A Noise Sensitivity Analysis.

DESCRIPTIVE NOTE: Annual rept. (Final) 21 Jul 89-20 Jul 90,

AUG 90 41P

PERSONAL AUTHORS: Haney, Michael W.; Levy, James J.; Athale, Ravindra A.

REPORT NO. BDM/MCL-90-0757-TR

CONTRACT NO. F49620-89-C-0115

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR, XF
TR-90-0915, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Neural networks represent a promising alternative to traditional artificial intelligence approaches. The developement of analog optical implementations of neural networks such as the multilayer perceptron with learning by backward error propagation (BEP) requires an understanding of the noise sensitivity of such architectures. The objective of this program is to study the effects of component and system noise on the performance of such optical implementations. The method used is computer simulation. In this first phase of the program, the one-hidden layer perceptron with back propagation was simulated using a simplified, device-independent noise model. The results point to a distinct noise threshold above which the learning mechanism is corrupted. The efficiency of learning based on variations within back propagation on the initializing method was also studied. In the next phase, a device-dependent noise model will be used. To this end a plausible all-optical architecture capable of both the forward pass and backward error propagation steps of training data presentation has been proposed. Author (kr)

AD-A226 789

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A226 789 CONTINUED

DESCRIPTORS: (U) *ANALOG SYSTEMS, *NEURAL NETS, *NOISE ANALYZERS, *OPTICAL PROPERTIES, APPROACH, ARTIFICIAL INTELLIGENCE, COMPUTERIZED SIMULATION, LEARNING, NOISE, PROPAGATION, SENSITIVITY, THRESHOLD EFFECTS, TRAINING.

IDENTIFIERS: (U) WUAFOSR2305B1.

AD-A226 789

AD-A226 788 5/8

OREGON UNIV EUGENE DEPT OF PSYCHOLOGY

(U) Investigating Individual Differences in General Comprehension Skill: The Role of Suppression and Enhancement.

DESCRIPTIVE NOTE: Final technical 1 Apr 89-1 Apr 90,

AUG 90 69P

PERSONAL AUTHORS: Gernsbacher, Morton A.

CONTRACT NO. AFOSR-89-0305

PROJECT NO. 2313

TASK NO. A7

MONITOR: AFOSR TR-90-0945

UNCLASSIFIED REPORT

ABSTRACT: (U) Investigation into whether the cognitive mechanism of suppression underlies differences in adult comprehensions skills are reported. Less-skilled comprehenders less-efficiently reject the inappropriate meaning of ambiguous words (e.g., the playing card vs garden tool meaning of spade), the incorrect forms of homophones (e.g., patients vs patience), the highly-typical-but-absent members of scenes (e.g., tractor in a farm scene), and words superimposed on pictures of pictures surrounding words. however, less-skilled comprehenders are not less cognizant of what is contexually appropriate, in fact, they benefit from a biasing context just as much (and perhaps more) as more-skilled comprehenders do. So, comprehenders do no have difficulty enhancing contexually appropriate information. Instead, it is suggested that less-skilled comprehenders suffer from less-efficient suppression mechanism, which we conclude is an important component of general comprehension skill. (sdw)

DESCRIPTORS: (U) *COGNITION, *COMPREHENSION, *SKILLS, PICTURES, SHOVELS, SUPPRESSION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A7, Individual differences.

AD-A226 788

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A226 787 20/6

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF MATERIALS SCIENCE AND ENGINEERIN G

(U) Investigation of New Semiinsulating Behavior of III-V Compounds.

DESCRIPTIVE NOTE: Final technical rept. 16 Aug 86-28 Feb 90,

FEB 90 50P

PERSONAL AUTHORS: Lagowski, Jacek

CONTRACT NO. AFOSR-86-0342

PROJECT NO. 2306

TASK NO. B1

MONITOR: AFOSR, XF
TR-90-0939, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Study of transition metal impurities have defined direct effects associated with deep donor/ acceptor levels acting as compensating centers. Electrical and optical properties of vanadium and titanium levels were determined in GaAs. The experimental data provided basis for the verificatcn of chemical trends and defined compositional range for III-V mixed crystals whereby semiinsulating behavior can be achieved using transition elements deep levels and a suitable codoping with shallow donor/acceptor impurities. (Js/Js)

DESCRIPTORS: (U) *GROUP III COMPOUNDS, *OPTICAL PROPERTIES, CHEMICALS, COMPENSATION, COMPOSITION(PROPERTY), CRYSTALS, ELECTRICAL PROPERTIES, ELECTRON ACCEPTORS, EXPERIMENTAL DATA, GROUP V COMPOUNDS, IMPURITIES, MIXING, PATTERNS, SHALLOW DEPTH, TITANIUM, TRANSITION METALS, VANADIUM, VERIFICATION.

IDENTIFIERS: (U) Review.

AD-A226 786 6/5

CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF PSYCHIATRY

(U) Extrathalamic Modulation of Cortical Function.

DESCRIPTIVE NOTE: Final technical 1 pr 89-31 Mar 90,

JUL 90 11P

PERSONAL AUTHORS: Foote, Stephen L.

CONTRACT NO. F49620-87-C-0038

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR, XF
TR-90-0920, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The overall goal of these studies is to characterize the effects of noradrenergic (NA) afferents on cortical information processing. Our previous studies indicate that the primate locus coeruleus (LC) system, originating in the pontine brainstem, innervates neocortex more densely than previously thought, exhibiting highly specific patterns in terms of the regional and laminar distribution of its axons across the neocortex. Previous neurophysiological observations suggest that this highly divergent system imposes state-related modulatory effects on thalamo-cortical and cortico-cortical systems. For example, we have shown that primate LC-NA neurons are more active during waking than sleep and exhibit bursts of activity during increases in attentiveness. Keywords: Locus coeruleus, noradrenergic, Event-related potential. (js)

DESCRIPTORS: (U) *NERVE FIBERS, DISTRIBUTION, LAMINAR FLOW, LOCUS, NEUROPHYSIOLOGY, PATTERNS, PRIMATES, SLEEP.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A226 785 9/1 20/12

PURDUE UNIV LAFAYETTE IN SCHOOL OF ELECTRICAL ENGINEERING

(U) Investigation of a New Concept in Semiconductor Microwave Oscillators.

DESCRIPTIVE NOTE: Final rept. 1 May 85-30 Apr 90,

JUN 90 19P

PERSONAL AUTHORS: Cooper, James A., Jr

CONTRACT NO. AFOSR-85-0193

PROJECT NO. 2305

TASK NO. C1

MONITOR: AFOSR, XF
TR-90-0971, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) We have investigated a new type of millimeter wave oscillator device based on a resistive gate MESFET structure. The resistive gate establishes a uniform electric field in the regime of negative differential mobility for electrons in GaAs. At these fields, dipolar charge domains form in the channel and drift into the drain, producing microwave oscillations in the drain current. In the contiguous domain mode, a continuous sequence of charge domains forms throughout the channel. This mode is possible because the resistive gate screens the self-induced fields of each dipolar domain, keeping the field outside the domain unperturbed. Frequencies up to 100+ Ghz are predicted, independent of channel length, and the frequency should be tunable over at least one octave by varying the gate-to-source voltage. This mode has not yet been observed experimentally, since the gate resistivity on our prototype devices has been too large. These devices are presently operating a single domain transit time mode, producing oscillations in the 6 to 28 GHz range for channel lengths from 5 to 20 micron. Work is continuing to reduce the gate resistivity so that the contiguous domain mode can be observed. (rrh)

DESCRIPTORS: (U) *CHANNELS, *DIPOLES, *DRAINAGE, *DRIFT, *MICROWAVE OSCILLATORS, *RESISTANCE, *SEMICONDUCTORS,

AD-A226 785

AD-A226 785 CONTINUED

ELECTRIC FIELDS, ELECTRONS, GATES(CIRCUITS), LENGTH, MICROWAVES, MILLIMETER WAVES, MOBILITY, OSCILLATION, OSCILLATORS, PROTOTYPES, SEQUENCES.

IDENTIFIERS: (U) WUAFOSR2305C1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A226 784 9/1 12/6

BOSTON UNIV MA COLL OF ENGINEERING

(U) Sensor Based Control of Robotic Mechanisms.

DESCRIPTIVE NOTE: Final rept. 1 Dec 88-31 May 90,

AUG 90 14P

PERSONAL AUTHORS: Baillieul, John

CONTRACT NO. AFOSR-89-0135

PROJECT NO. 3842

TASK NO. A5

MONITOR: AFOSR, XF
TR-90-0970, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report provides a detailed account of equipment purchases made under a DoD University Research Instrumentation Grant (AFOSR-89-0135). The equipment includes a Silicon Graphics IRIS 4D/120GTX workstation and a variety of hardware components which have been selected as components of real-time server network designed to support a graphical interface to experiments in the control of mechanical systems. A brief description is provided of the resulting hardware implementation and its use in controlling three different experimental systems-a flexible beam, a rotating kinematic chain, and a six axis industrial robot. A detailed breakdown of expenditures is provided. (rh)

DESCRIPTORS: (U) *CONTROL SYSTEMS, *DETECTORS, *ROBOTICS, CHAINS, CONTROL, GRAPHICS, INDUSTRIAL EQUIPMENT, INTERFACES, KINEMATICS, MECHANICAL COMPONENTS, PROCUREMENT, REAL TIME, ROBOTS, ROTATION.

IDENTIFIERS: (U) WUAFOSR3842A5, PE61104D.

AD-A226 783 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) Some New Estimation Methods for Weighted Regression When There are Possible Outliers,

AUG 86 13P

PERSONAL AUTHORS: Giltinan, David M.; Carroll, Raymond J.; Ruppert, David

CONTRACT NO. F49620-82-C-0009, $NSF-MCS81-00748

MONITOR: AFOSR, XF
TR-90-0934, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Technometrics, v28 n3 p219-230 Aug 86.

ABSTRACT: (U) The problem considered is the robust estimation of the variance parameter in a heteroscedastic linear model. We treat the situation in which the variance is a function of the explanatory variables. To estimate robustly the variance in this case, it is necessary to guard against the influence of outliers in the design as well as outliers in the response. By analogy with the homoscedastic regression case, we propose two estimators that do this. Their performances are evaluated on a number of data sets. We had considerable success with estimators that bound the self-influence-that is, the influence an observation has on its own fitted value. We conjecture that in other situations (e.g., homoscedastic regression) bounding the self-influence will lead to estimators with good robustness properties. Keywords: Reprints. (Author) (kr)

DESCRIPTORS: (U) *ESTIMATES, *REGRESSION ANALYSIS, *WEIGHTING FUNCTIONS, DATA BASES, METHODOLOGY, PARAMETERS, REPRINTS, VARIATIONS.

IDENTIFIERS: (U) Outliers.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A226 782 6/4 5/8

RUTGERS - THE STATE UNIV NEW BRUNSWICK NJ DEPT OF PSYCHOLOGY

(U) Eye Movements and Visual Information Processing.

DESCRIPTIVE NOTE: Interim progress rept. Apr 89-Apr 90,

AUG 90 4P

PERSONAL AUTHORS: Kowler, Eileen

CONTRACT NO. AFOSR-88-0171

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR, XF
TR-90-0978, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This research extended our understanding of the visual and cognitive process controlling saccadic and smooth eye movements, and the role of these eye movements in visual information acquisition. Experiments showec that: (1) saccades are biased toward likely locations of targets, suggesting that previous reports of 'center-of-gravity' reflexes are actually due to search of attentional strategies; (2) saccades can be directed to spatially-extended targets with an accuracy and precision as good as those found for single point targets; (3) predictive smooth eye movements are caused by cognitive expectations about future path of target motion, not by learned oculomotor habits; (4) slow control is not sensitive to position error; (5) smooth eye movements are sensitive to the expected direction of future target motion; (6) strategies of scanning the boundaries of difficult texture patterns are more effective than strategies of scanning the symmetric axis; (7) normal reading is carried out by a coordinated pattern of eye movements and head movements.

DESCRIPTORS: (U) *EYE MOVEMENTS, *VISUAL TARGETS, VISUAL PERCEPTION, CONTROL, ATTENTION, COGNITION, MOVING TARGETS, SCANNING, READING, PSYCHOPHYSICS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A5.

AD-A226 782

AD-A226 768 20/5

PHYSICAL SCIENCES INC ANDOVER MA

(U) Rotational Energy Transfer in Metastable States of Heteronuclear Molecules.

DESCRIPTIVE NOTE: Interim rept., 27 Jun-26 Dec 88,

JAN 89 32P

PERSONAL AUTHORS: Davis, Steven J.

REPORT NO. PSI-1006/TR-855

CONTRACT NO. F49620-86-C-0061

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XF
TR-90-0913, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of this program is to measure and interpret state-to-state R-T transfer rate coefficients for selected interhalogen molecules. Spectrally resolved CW laser-induced fluorescence is the experimental method being used. A CW dye laser excites pure quantum states. The resolved fluorescence of the laser-excited level and the collisionally populated J' levels are analyzed. We have determined nearly 1000 state-to-state rate coefficients for R-T transfer IF(B). Collision partners include He, Ne, Ar, Kr, Xe N2, and CF4. Rate coefficients have also been determined for several initially excited J': 13, 27, 35 and 72. Keywords: Energy transfer, Rotational-translational transfer, Interhalogen molecules. (js)

DESCRIPTORS: (U) *METASTABLE STATE, *MOLECULES, COEFFICIENTS, CONTINUOUS WAVE LASERS, DYE LASERS, ENERGY TRANSFER, EXCITATION, FLUORESCENCE, HALOGEN COMPOUNDS, LASER BEAMS, PURITY, QUANTUM ELECTRONICS, RATES, ROTATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1.

AD-A226 768

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI59A

AD-A226 740 20/5

EMORY UNIV ATLANTA GA DEPT OF CHEMISTRY

(U) Electronic Spectroscopy of the ArOH and ArOD Complexes.

JAN 90 10P

PERSONAL AUTHORS: Fawzy, Wafaa M.; Heaven, M. C.

CONTRACT NO. AFOSR-88-0249

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XF
TR-90-0976, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v92 n2 p909-916, 15 Jan 90.

ABSTRACT: (U) In general, neutral-free radicals can bind to a rare gas atom through electrostatic forces, charge transfer, and, when hydrogen is present, hydrogen bonding. The relative importance of these types of bonding may be deduced from spectroscopic analysis of the rotational structure of these complexes. Rare gas atom-diatomic radical complexes are the simplest polyatomic prototypes for initial investigations. The geometry of such a complex, determined from the rotational structure, provides valuable qualitative information concerning the dominant bonding mechanism. Finer details of the intramolecular interactions will be reflected in the spin-rotation and hyperfine coupling constants. When the radical possess electronic orbital angular momentum, additional insight can be gained from the effect of complex formation on the spin-orbit coupling. (js)

DESCRIPTORS: (U) *ANGULAR MOMENTUM, *BONDING, *SPECTROSCOPY, ATOMS, CHARGE TRANSFER, CONSTANTS, COUPLING(INTERACTION), ELECTRONICS, ELECTROSTATIC FIELDS, HYDROGEN, HYDROGEN BONDS, HYPERFINE STRUCTURE, ORBITS, POLYATOMIC MOLECULES, PROTOTYPES, RARE GASES, ROTATION, SPINNING(MOTION).

AD-A226 740

AD-A226 739 20/10 12/9 20/12

MISSOURI UNIV-ST LOUIS

(U) Quantum 1/f Noise in High Technology Applications Including Ultrasmall Structures and Devices.

DESCRIPTIVE NOTE: Annual rept. no. 1, 15 Jul 89-14 Jul 90,

JUL 90 43P

PERSONAL AUTHORS: Handel, Peter H.

CONTRACT NO. AFOSR-89-0416

PROJECT NO. 2305

TASK NO. C1

MONITOR: AFOSR, XF
TR-90-0938, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Quantum 1/f noise is basic property of physical cross sections and process rates and a form of quantum chaos in the nonlinear system of the charged particles plus the electromagnetic field. Therefore, the present report starts with a consideration of the general problem of 1/f spectra in nonlinear systems, derives for the first time a general sufficient criterion which tells us if a system will show 1/f noise, and applies the new criterion to transport in semiconductors, in metals, on highways, and in quantum electrodynamics. In all these cases 1/f spectra follow from the same criterion, in the same way. This is, for the first time, a unifying principle. In addition, the report contains the first rigorous first principles derivation of quantum 1/f mobility fluctuations in semiconducting materials (analytical) and reference to a Monte Carlo simulation of the same problem. Finally, a solution for the long-standing problem of quantum 1/f noise in the collector of BJT's is proposed. (rrh)

DESCRIPTORS: (U) *QUANTUM ELECTRODYNAMICS, *SEMICONDUCTORS, CROSS SECTIONS, ELECTROMAGNETIC FIELDS, HIGHWAYS, LONG RANGE(TIME), MATERIALS, METALS, MONTE CARLO METHOD, NONLINEAR SYSTEMS, PHYSICAL PROPERTIES, SIMULATION.

AD-A226 739

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO EVI59A

AD-A226 739 CONTINUED

IDENTIFIERS: (U) WUAFOSR2305C1, PE61102F, Quantum 1/F noise

AD A226 702 12/6

STANFORD UNIV CA DEPT OF COMPUTER SCIENCE

(U) Computational Equipment for the Development of Numerical Algorithms Computation.

DESCRIPTIVE NOTE: Final rept. 1 Oct 86-31 Mar 88,

AUG 90 4P

PERSONAL AUTHORS: Golub, Gene H.

CONTRACT NO. AFOSR-87-0084

MONITOR: AFOSR, XF
TR-90-0998, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Under this grant, the following equipment was purchased: 7 SUN 3/50 workstations; 1 SUN 3/260 workstation; 1 SUN 3/180 file server; 1 CDC disk; 1 Eagle disk; 2 Apple Laser Writer printers. This equipment was of utmost importance in our research in the Scientific Computing and Computational Mathematics Program at Stanford. In particular, it allowed us to analyze, devise, and study various numerical algorithms associated with our research activity. I enclose a list of recent reports which depended heavily on the use of this equipment. Here are some special activities: The Lanczos method is a well known method for computing the eigen-values of symmetric matrices. For many years there has been an attempt to generalize this algorithm for matrices that are non-symmetric. There have been inherent difficulties, and for a long time it was not understood how to modify the algorithm for the non-symmetric case. In the last year, it has finally been understood how to formulate a stable and robust algorithm. We were able to develop numerical software for operating on non-symmetric matrices. (kr)

DESCRIPTORS: (U) *COMPUTATIONS, *DATA PROCESSING EQUIPMENT, *WORK STATIONS, ALGORITHMS, ASYMMETRY, COMPUTER PROGRAMS, LONG RANGE(TIME), MATHEMATICS, NUMERICAL ANALYSIS, NUMERICAL METHODS AND PROCEDURES.